appears in Message Display, ***non-insistent*** audio alarm sounds, volume to be infused display is 0, and rate changes to 3 mL/h. Press ***Hold***.

- Check burette and verify a volume of 49 mL, ±1 mL, on Model 3000. If checking a Micro 3100, verify burette holds 25 mL ±1/2 mL. Remember to take measurement from bottom of meniscus.

Rate Accuracy:

- Rate accuracy can be verified at same time as volume accuracy. When setting up for volume accuracy, also obtain a stopwatch. When the pumping indicator starts moving, start stopwatch.
- Verify alarm occurs at 2 minutes, 56.6 seconds (±3 seconds) if checking a Model 3000. If checking a Micro 3100, alarm should occur at 15 minutes (±18 seconds).
- Disconnect and drain burette.

5.8 Troubleshooting

Table 5-2 lists problems, possible causes, and corrective action for troubleshooting the Model 3000 and Micro 3100 Infusion Pumps.

3M recommends that you maintain a complete set of properly functioning circuit boards for each model pump you have. These test boards can be useful for diagnostic troubleshooting when circuit board repairs are indicated. Electronic malfunctions should be narrowed to a specific circuit board. Because the circuit boards in the Model 3000 and Model 3100 are primarily surface mount technology, component level repair is not recommended.

CAUTION
The functional and accuracy check should be performed following any significant disassembly or repair of 3M infusion pumps.

CAUTION
Electrostatically sensitive components are used in the manufacture of 3M infusion pumps. Protection against electrostatic discharge (ESD) must be provided when handling printed circuit boards.

Table 5-2 Troubleshooting Guide

Situation	Cause	Solution
No DC power up (disconnect AC power cord before trouble-shooting).	1. Battery will not maintain charge.	1. Replace battery.
	2. Wire connection between battery and P104 on I/O board.	1. Repair wire connection or replace wire assembly.
	3. Open battery fuse F101 on I/O board.	1. Replace battery fuse.
	4. Q2 on Power Supply/CPU board faulty.	1. Replace Power Supply/CPU board.
No AC power up, charge light does not light and battery light is on (disconnect battery before trouble-shooting).	1. Open AC fuse F1 on Power Supply/ CPU board (open AC fuse F2).	1. Replace AC fuse.
	2. Wire connection between RFI line filter and Power Supply/CPU board.	1. Repair wire connection.
	3. Open thermal fuse within trans-former.	1. Replace Power Supply/CPU board.
	4. Open connection in AC power cord.	1. Replace AC power cord.
Battery and Charge lights both lit.	1. Faulty 18 volt regulator.	1. Replace Power Supply/CPU board.
Battery will not charge.	1. Faulty battery.	1. Replace battery.
	2. Faulty U109 on I/O board.	1. Replace I/O board.
Dead battery alarm (`Battery too low/ plug in cord`).	1. Go to options screen and perform battery test.	1. If battery is low, charge battery.
	2. JP402 on Display board dis-connected.	1. Repair connection.
	3. Faulty U408, A to D converter on Display board.	1. Replace Display board.
Low battery alarm (`Low battery/ plug in cord`).	1. Go to options screen and perform battery test.	1. If battery is low, charge battery.
	2. Faulty U415 on Display board.	1. Replace Display board.
	3. Faulty U408, A to D converter on Display board.	1. Replace Display board.
No keypad response.	1. Faulty connection between membrane switch and Display board.	1. Repair connection.
	2. Faulty membrane switch.	1. Replace membrane switch.
`Loading problem/check tubing set`	1. Cassette loaded in backwards (flat side inward).	1. Properly load cassette.
	2. Faulty connection to pressure plate micro switch.	1. Repair connection to micro switch.
	3. Faulty U414, U409 on Display board.	1. Replace Display board.
	4. Motor stalls in reverse.	1. Repair wire connection at P103 on I/O board (motor wires). 2. Replace I/O board. 3. Replace Display board. 4. Replace motor.

✓ para 4.24.5 p.4-16

Table 5-2 Troubleshooting Guide - Continued

Situation	Cause	Solution
Air in cassette	1. Cassette loaded in backwards (flat side inward).	1. Properly load cassette.
	2. Faulty U103, U107 on I/O board.	1. Replace I/O board.
	3. Faulty optical detector.	1. Replace optical detector and emitter.
No flow/above pump	1. Faulty connection at P102.	1. Repair connection.
	2. Open contact wire.	1. Repair wire connection.
	3. Contact out of position.	1. Reposition contact in guide slot.
	4. Faulty U104, U105 on I/O board.	1. Replace I/O board.
	5. Contaminant on top piston shaft.	1. Clean top piston shaft.
Primary audio failure (***Back Up*** audio sounds, system error is displayed.	1. Faulty U16, Q8, Q9, Q12, Q13 on CPU/Power Supply board.	1. Replace CPU/Power Supply board.
Primary audio failure (primary audio sounds, system error is displayed.	1. Faulty U5, U10, U11 on CPU/Power Supply board.	1. Replace CPU/Power Supply board.
Back Up/Continuous audio failure.	1. Open fuse (F101) on I/O board.	1. Replace fuse.
	2. Loose fuse (F101).	1. Tighten contact between fuse and holder.
Occlusion/below pump	1. Faulty pressure sensor.	1. Replace pressure plate.
	2. Faulty wire connection to pressure sensor.	1. Repair wire connection.
	3. Faulty connection to J404.	1. Repair connection.
	4. Faulty U409 on Display board.	1. Replace Display board.
Close clamp!/Load safety clip	1. Faulty micro switch.	1. Replace micro switch.
	2. Faulty wire connection to micro switch.	1. Repair wire connection.
	3. Faulty connection at P102.	1. Repair connection.
	4. Faulty U104 on I/O board.	1. Replace I/O board.
Door open	1. Faulty micro switch.	1. Replace micro switch.
	2. Faulty wire connection to micro switch.	1. Repair connection.
	3. Faulty connection at P102.	1. Repair connection.
	4. Faulty U104 on I/O board.	1. Replace I/O board.

5.9 Disassembly and Reassembly Instructions

DANGER
Potentially dangerous voltages are exposed when the pump housing is open and the AC power cord is plugged in. These voltages are present in the following areas: the transformer and AC fuse on the CPU/Power supply board; the RFI line filter where the power cord connects. To avoid electric shock with potential for severe injury or death, avoid touching these areas when the power cord is plugged in.

CAUTION
The Functional and Accuracy Check should be performed following any significant disassembly or repair of the 3M infusion pumps.

NOTE
3M Infusion Therapy recommends that technicians attend a Service Training Seminar prior to beginning service or repair of this product.

1. Battery Removal

The 3M infusion pumps come with a 12 volt battery for short duration use. Unplug the AC power cord. Remove screw which holds battery door in place and slide battery door toward bottom of pump. Remove battery clamp and slide battery partially out of pump. Pull lead connectors from battery terminals and remove battery. Reverse the procedure to replace the battery (see Figure 5-2).

DANGER
Potentially dangerous voltages are present when the housing is open and the AC power cord is plugged in. These voltages are present in the following areas: the transformer and AC fuse on the CPU/Power supply board; the RFI line filter where the power cord connects. To avoid electric shock with potential for severe injury or death, always unplug AC power cord before beginning disassembly of the 3M pumps.

2. AC Fuse

Unplug pump from AC power. Remove battery as described in step 1. AC fuse is located directly above RFI line filter on CPU/Power Supply board; it can be removed with a long nose pliers (see Figure 5-2).

3. Front Housing

CAUTION
Do not use a screwdriver or other sharp instrument to separate the front and rear housing or pump damage may occur.

CAUTION
Electrostatically sensitive components are used in the 3M pump design. Protection against electrostatic discharge (ESD) must be provided when handling printed circuit boards.

Remove 2 screws from pump handle, 1 screw from rear cover near bottom left corner of AC cord connector cover, and 1 screw from battery door on bottom of the pump (see Figure 5-2). Pull front housing away from rear housing.

The front housing remains connected to the rear housing by the SPI ribbon cable. This must be disconnected from the CPU/Power supply board (P200) to completely free the front housing assembly.

The front housing is reinstalled by reversing the procedure, being careful not to damage the gasket retainers on the front cover. Before replacing screws in housing, perform the functional and accuracy check. If check is satisfactory, complete housing reassembly.

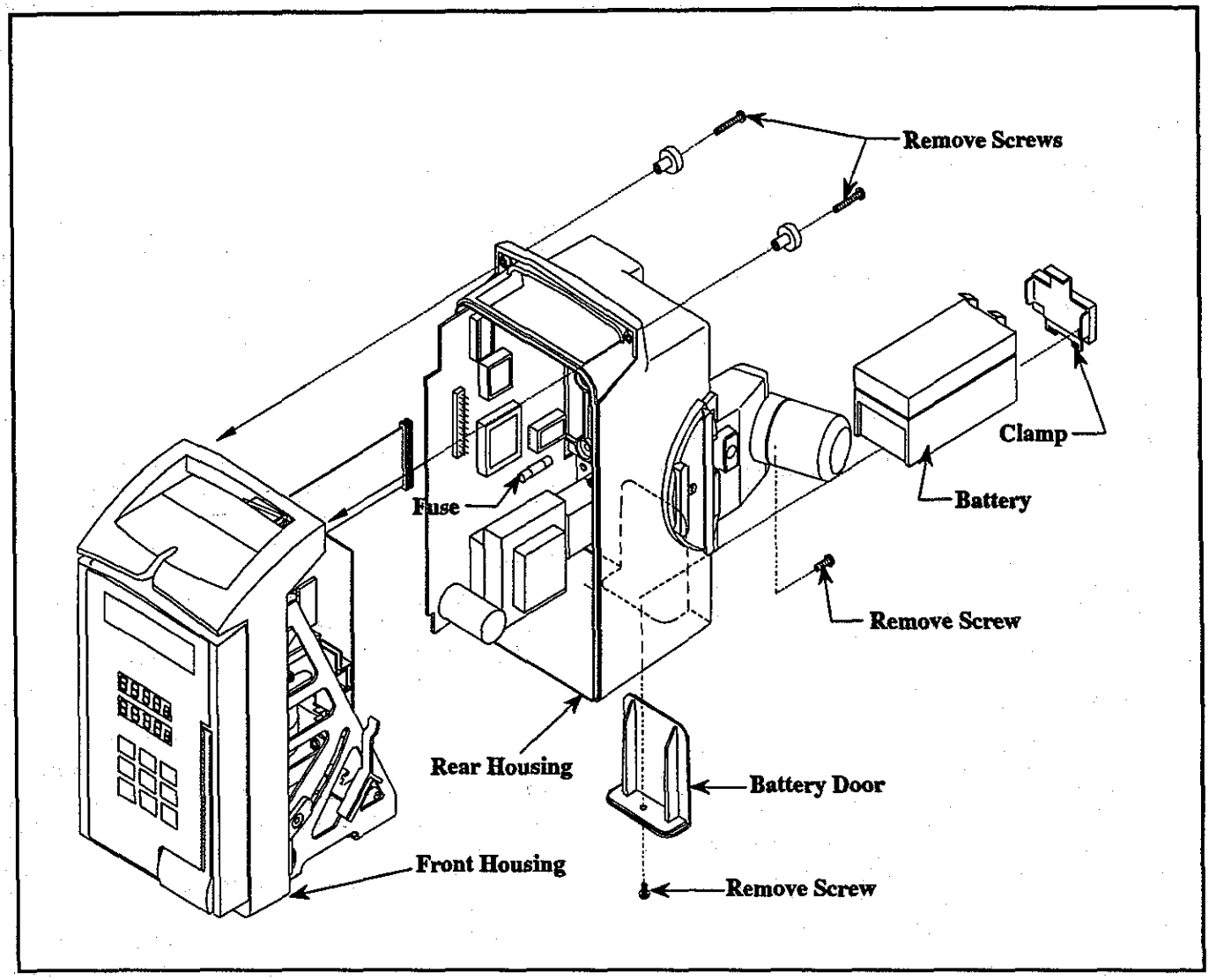

Figure 5-2
Battery & AC Fuse Removal, Front/Rear Housing Disassembly

4. Door Assembly

See Figure 5-3 for the following discussion.

Open door. Remove 2 screws from lower hinge bracket and slide door out. Remove 2 screws from door latch/handle, and remove handle. Disconnect SPI cable from I/O board and CPU board. Remove 4 screws from rear door housing. Separate front and rear door housings slightly, then disconnect wire assemblies from pressure transducer and pressure plate switch.

To remove pressure plate assembly, remove 4 screws which fasten it to rear door housing.

Reverse the process for reassembly, being sure the ESD cover slides into the front pump housing.

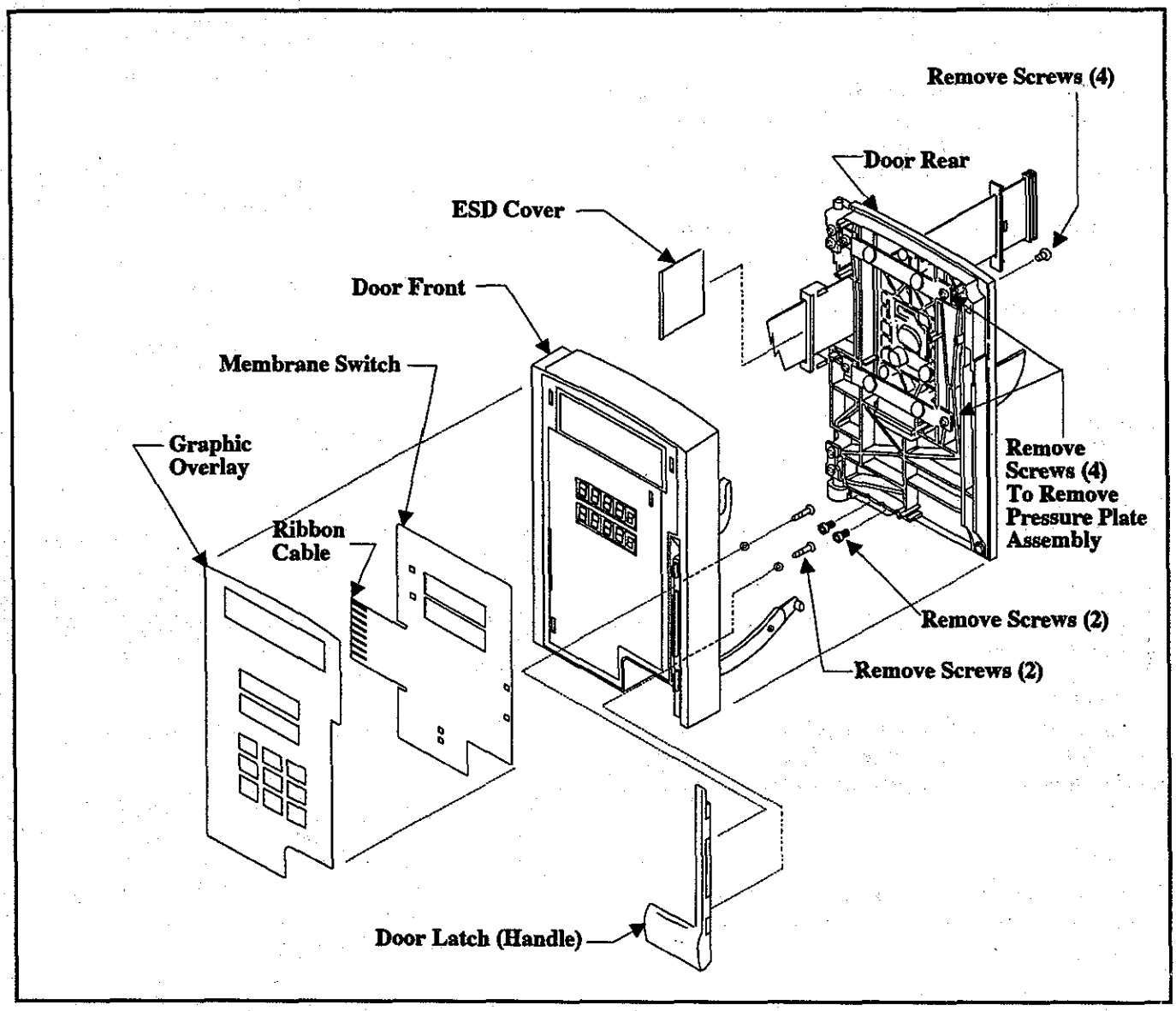

Figure 5-3
Door Disassembly

5. CPU/Power Supply Circuit Board Assembly

DANGER
Unplug the AC power cord before beginning disassembly to avoid risk of electric shock.

CAUTION
Handling of the printed circuit boards is required during disassembly; protection against electrostatic discharge (ESD) must be provided or circuit board damage could result.

CAUTIONBattery connection P104 on I/O board must be disconnected before disassembling the circuit boards to avoid circuit damage.

To remove the CPU/Power supply, I/O Board, or RS232 board, remove front housing first.

Disconnect SPI cable from P200. On rear of pump, remove threaded Panel Lockout Button (turn counter clockwise), nut, and internal tooth washer. Remove audio volume knob and nut. Remove 2 screws from RS232 connector.

From inside rear cover, disconnect brown and blue RFI line filter wires from CPU/Power Supply board.

Slide CPU/Power supply out of rear cover.

Reassemble in reverse order.

Before replacing screws in pump housing, perform functional and accuracy check. If check is satisfactory, complete housing reassembly.

6. I/O Board Assembly

DANGER
Unplug AC power cord before opening pump housing to avoid risk of electric shock.

CAUTION
Handling of printed circuit boards is required during disassembly; protection against electrostatic discharge (ESD) must be provided or circuit board damage could result.

CAUTION
Battery connection P104 on I/O board must be disconnected before disassembling the circuit boards to avoid circuit damage.

The I/O board is mounted to the back of the pump assembly (see Figure 5-4).

Disconnect SPI cable from P200 on CPU/Power supply board and P101 on I/O board. Disconnect motor wire assembly from P103 on I/O board, and sensor wire assembly from P102 on I/O board. Remove 4 screws fastening board to pump mechanism.

Reassemble in reverse order.

Before replacing screws in pump housing, perform the functional and accuracy check. If check is satisfactory, complete housing reassembly.

7. Membrane Switch Replacement

DANGER
Unplug AC power cord before opening pump housing to avoid risk of electric shock.

CAUTION
Handling of printed circuit boards is required during disassembly; protection against electrostatic discharge (ESD) must be provided or circuit board damage could result.

CAUTION
Battery connection P104 on I/O board must be disconnected before disassembling the circuit boards to avoid circuit damage.

See Figure 5-3 for the following discussion.

The membrane switch consists of two parts; the lower electronic switch and the upper overlay with keypad graphics. Once in place on the door assembly, they are removed as a single unit. The original membrane switch must not be reinstalled after removal because electrical damage during removal is likely to occur.

The door must be disassembled (see step 4 Door Assembly) in order to replace the membrane switch. Once door assembly is opened, remove ribbon connector from P403 on display board, then remove display board. On front of door, peel up and discard old membrane switch. Clean any residual adhesive off of housing.

To replace the membrane switch, follow the instructions below:

1. Peel release liner off back of electronic switch portion (front of membrane switch has raised domes). Release liner on front must not be removed at this time.
2. Thread ribbon cable through slot provided on door front.
3. Apply membrane switch to door front. Press firmly around outer edges, around display windows, and vertically between rows of domed switches using keypad tool (see Section 5.5 Special Tools). Avoid excess pressure on domes themselves.
4. Once electrical switch portion is firmly in place, remove release liner from its front. Also, remove release liner from back of graphics overlay.

5. Place graphics overlay over electrical switch portion, making sure to line it up correctly with electrical switch portion. Press firmly around outer edges, around display windows, and vertically between rows of numbers using keypad tool (see Section 5.5 Special Tools). Avoid excessive pressure on keypads themselves.
6. Connect ribbon cable to P403 on back of display board. Press board firmly into board retainers.

Reassemble door as described in step 4. Perform functional and accuracy check. If check is satisfactory, complete housing reassembly.

8. Pump Assembly

DANGER
Unplug AC power cord before opening pump housing to avoid risk of electric shock.

CAUTION
Handling of printed circuit boards is required during disassembly; protection against electrostatic discharge (ESD) must be provided or circuit board damage could result.

CAUTION
Battery connection P104 on I/O board must be disconnected before disassembling the circuit boards to avoid circuit damage.

The pump assembly consists of the cam housing/motor assembly. Separation of the front and rear housings and removal of the I/O board are required prior to removing the pump assembly (see Section 5.9, steps 3 and 6).

The pump assembly is separated from the rear housing in the following manner:

1. Remove screw from linkage assembly and upper retaining ring from connecting link, remove link from pin. Raise arm of the drop-in guide (see Figure 5.4) so linkage assembly can be removed from frame assembly.
2. Remove 4 screws from cassette housing and lift pump assembly out.

Reverse the procedure to reassemble pump assembly to rear housing. Before replacing screws in housing, perform the functional and accuracy check. If check is satisfactory, complete housing reassembly.

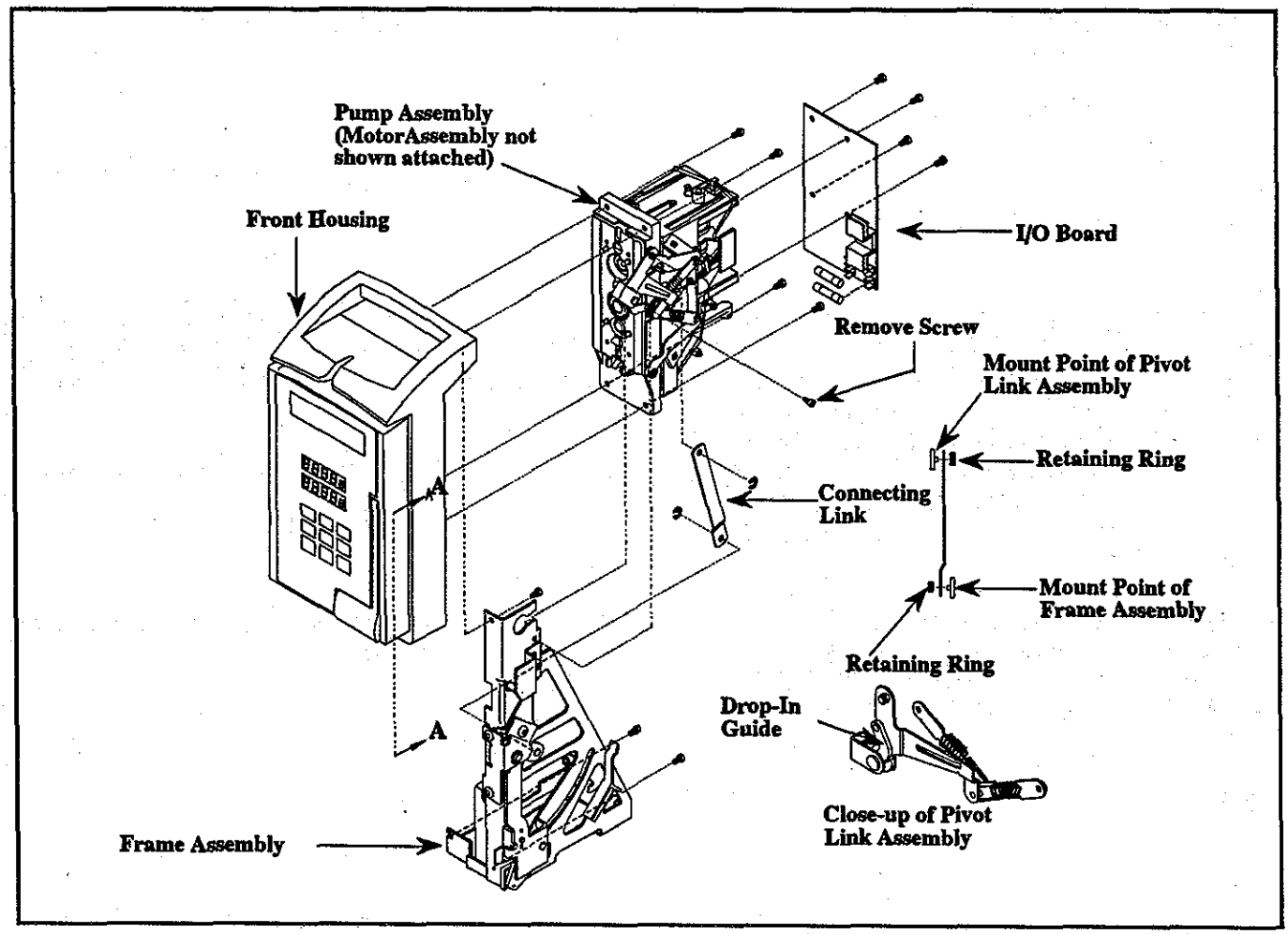

Figure 5-4
Pump Assembly Removal

9. Motor Assembly

DANGER
Unplug AC power cord before opening pump housing to avoid risk of electric shock.

CAUTION
Handling of printed circuit boards is required during disassembly; protection against electrostatic discharge (ESD) must be provided or circuit board damage could result.

CAUTION
Battery connection P104 on I/O board must be disconnected before disassembling the circuit boards to avoid circuit damage.

See Figure 5-5 for the following discussion.

The front housing, pump assembly, and I/O board must be disassembled in order to remove the motor assembly (see Section 5.9, numbers 3, 6, and 8).

Remove 4 motor mounting screws and take motor assembly out. Next, remove swing arm damper from coupler gear. Remove coupler gear. Finally, remove mounting plate with swing arm assembly intact.

Reverse the sequence to reassemble.

NOTE
When assembling the motor, the swing arm must properly align over the overpressure valve shaft.

CAUTION
Realignment of the motor coupler is necessary whenever the motor and cam shaft have been disassembled. A .002 inch spacing is required between the hub coupler that is attached to the cam shaft and the interface coupler, which is located between the motor (sprocket) and hub coupler. Repositioning of the hub coupler may be required to achieve this spacing. Also a .125 inch gap must be maintained between the coupler gear and the mounting plate.

Reverse the procedure to reassemble the pump. Reconnect all cables and connectors and secure the SPI cable with cable clamps on the left side of the pump housing. Reassemble the front and rear housings. Before replacing screws in housing, perform the functional and accuracy check. If check is satisfactory, complete housing reassembly.

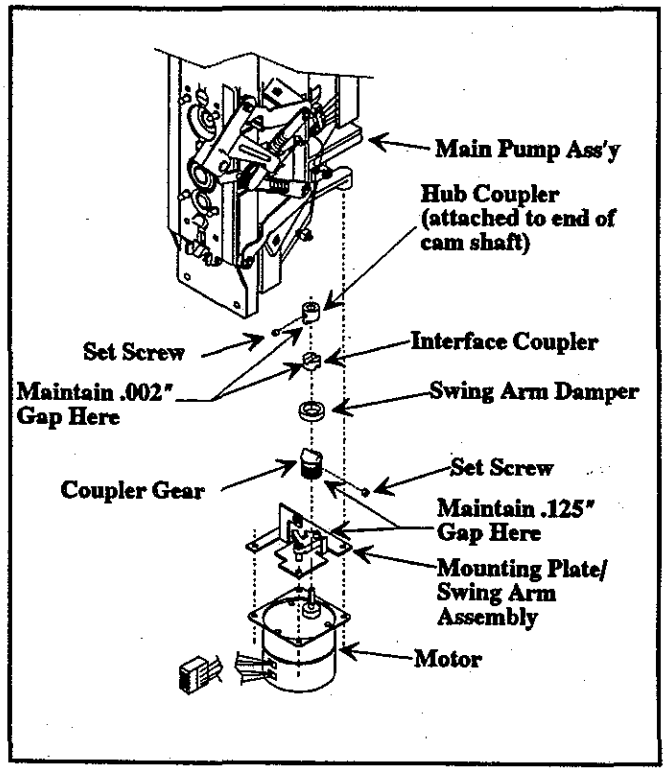

Figure 5-5
Motor Assembly

10. Cassette Housing

To disassemble the cassette housing, the front housing, I/O board, and pump mechanism must be removed first.

See Figure 5-6 for the following discussion.

Remove retaining ring from one end of each cassette shaft. Slide shaft out of cassette housing. Remove optical emitter and detector assemblies from cassette housing and remove cassette housing.

Reverse the procedure to assemble the cassette housing.

11. Safety Clip Mechanism

DANGER
Unplug AC power cord before opening pump housing to avoid risk of electric shock.

CAUTION
Battery connection P104 on I/O board must be disconnected before disassembling the circuit boards to avoid circuit damage.

See Figure 5-6 for the following discussion.

The front housing, pump mechanism, I/O board, and cassette housing must be removed to disassemble the safety clip mechanism.

The safety clip/flex wedge is attached to the cam housing. Remove springs from cassette housing guides. To disassemble, disconnect two wires from micro switch. Then, remove 2 mounting screws from cam housing. Reverse the procedure to reinstall.

NOTE
Loctite 42540 must be applied to the surface of the clip switch bracket that mates with the cam housing to assure assembly strength. Before tightening bracket screws, place fixture number 78-8069-6343-1 over the cassette housing guide pins and flex wedge to assure proper alignment, then tighten screws.

12. Door Switch

DANGER
Unplug AC power cord before opening pump housing to avoid risk of electric shock.

CAUTION
Battery connection P104 on I/O board must be disconnected before disassembling the circuit boards to avoid circuit damage.

The front housing, pump mechanism, I/O board, and cassette housing must be removed to disassemble the door switch.

Move linkage mechanism out of the way, disconnect switch wires and remove switch plate. Remove micro switch from switch plate. Reverse the procedure to reassemble.

NOTE
When installing the door switch assembly, the switch plate must be positioned so the switch is activated (open) when the cassette housing is bottomed on the cam housing but not activated (closed) when a .015" spacer is inserted between cassette housing spacing tab and cam housing. See Figure 5.7.

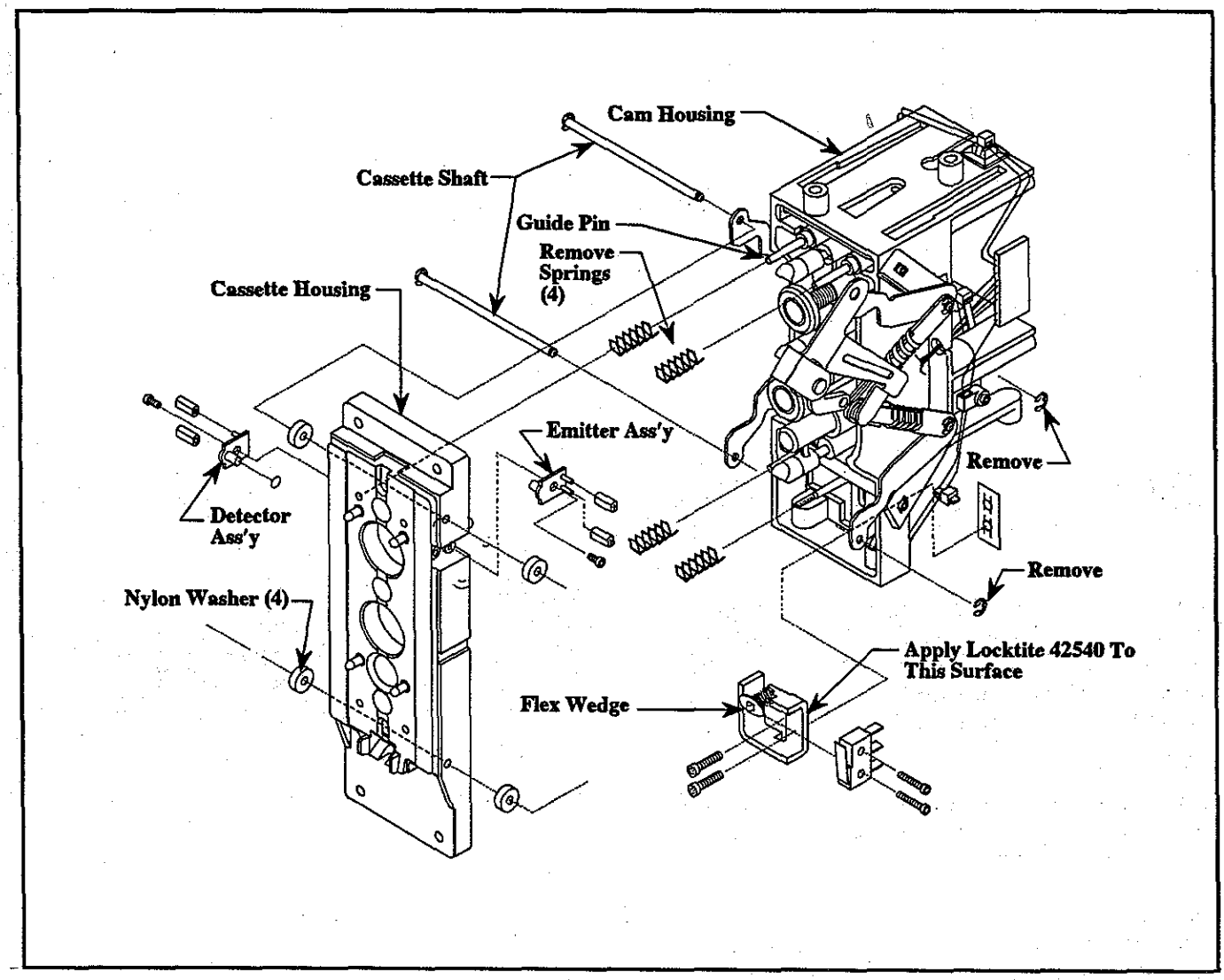

Figure 5-6
Cassette Housing & Safety Clip Mechanism Disassembly

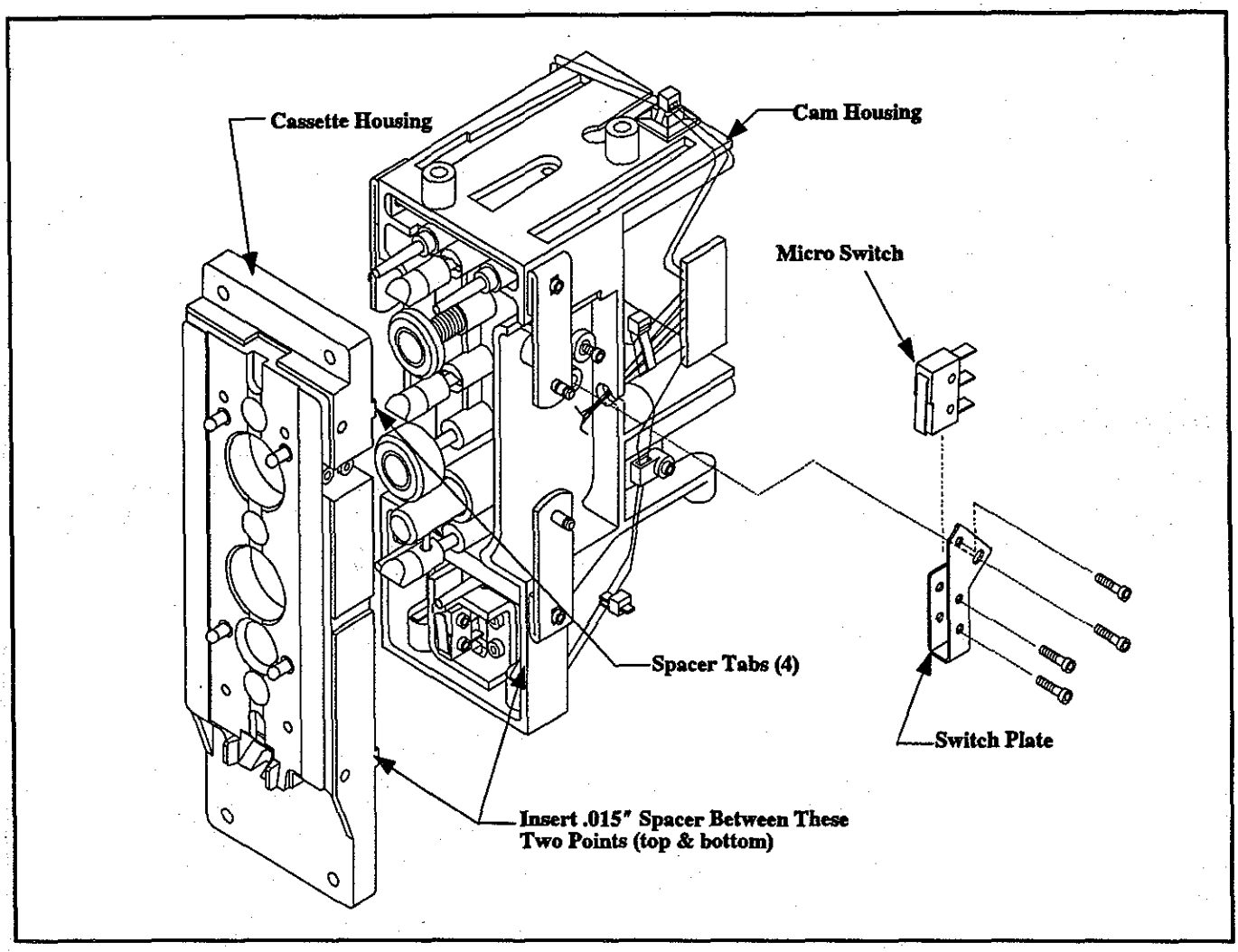

Figure 5-7
Door Switch Disassembly

5.10 Calibration and Voltage Checks

The following calibration and adjustment procedures may be necessary if indicated during the recommended twelve-month functional and accuracy check (see Section 5.7). Calibration and adjustment of affected components must also be performed following disassembly and repair.

CAUTION
The Functional and Accuracy Check (see Section 5.7) should be performed following calibration and adjustment of any of the following components.

NOTE
3M Infusion Therapy recommends that technicians attend a Service Training Seminar, offerred by the 3M Infusion therapy Service Center, prior to beginning service or repair of this product.

1. Power Supply Voltage Check

DANGER
Potentially dangerous voltages are present when the housing is opened and the AC power cord is plugged in. To avoid electric shock with the potential for causing severe injury or death, always unplug the AC power cord before beginning disassembly of the 3M pumps.

DANGER
Unplug AC power cord before opening pump housing to avoid risk of electric shock.

NOTE
There are no required adjustments for the following voltage checks.

Diodes D9, D10, and D11 direct voltage to the pump's logic circuitry. Source power to the logic circuitry is different when the pump is operated on battery than when it

is operated on AC power. The following two voltage checks verify the proper operation of the above diodes.

A. Disconnect pump from AC power and disconnect battery cable from P104 on I/O board. Connect a volt meter to cathode of D11 and TP7 (ground) on CPU/ Power Supply board. Plug pump into AC outlet and turn it on. Verify 16V ±1 volts. Turn pump off and unplug it from AC (see Figure 5-8).

B. Using battery cable, connect a DC power supply to P104 on I/O board. Adjust power supply voltage to 12.5 volts. Turn pump on and verify that voltage between cathode of D11 and TP7 is 12V ±1 volts (see Figure 5-9).

Disconnect pump from AC power and disconnect battery cable from P104 on I/O board. Connect a DVM to TP1 and TP7 (ground) on CPU/Power supply board. Plug pump into AC. Turn pump on and verify 13.8 V ±.2 volts (see Figure 5-10).

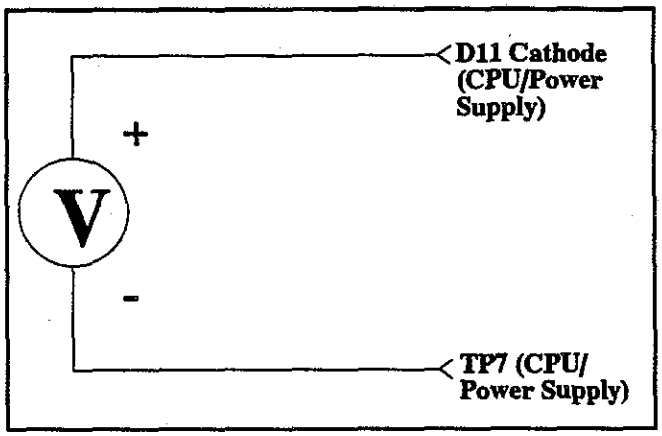

Figure 5-8
16 VDC Check. Power cord plugged into AC and pump turned on

2. 5.00 VDC Check

DANGER
Potentially dangerous voltages are present when the housing is opened and the AC power cord is plugged in. To avoid electric shock with the potential for causing severe injury or death, always unplug the AC power cord before beginning disassembly of the 3M pumps.

DANGER
Unplug AC power cord before opening pump housing to avoid risk of electric shock.

The front housing must be removed to verify this voltage. Unplug AC power cord and remove front housing (see Section 5.9, number 3). Disconnect battery wire assembly from P104 on I/O board. Connect a DC voltmeter to TP3 and ground (TP7). Figure 5-11 illustrates test set-up. Plug in AC power cord and turn pump on. Verify a level of 5.00 volts (±0.10 volts). Turn pump off.

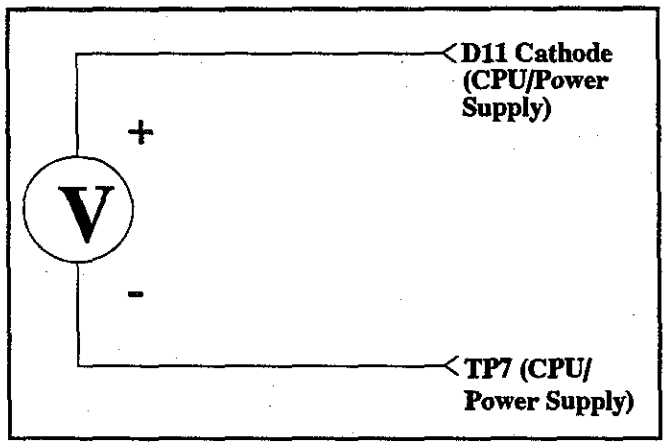

Figure 5-9
12 VDC Check. 12.5 VDC applied to battery leads and pump turned on.

3. Low Battery Alarm Calibration Check

A. Low Battery Alarm

Battery voltage is monitored by A/D converter (U408) and Display Control Unit (U402) on display board. If pump is operating under battery power and voltage falls below 11.60 volts, Display Control Unit signals CPU1 and a low battery alarm is activated. The low battery trip point may be verified without opening pump housing.

Unplug AC power cord. Open battery door as described in Section 5.9, number 1. Disconnect battery terminals. Connect both DC power supply and voltmeter across battery leads (red lead is positive and black lead is ground potential). Figure 5-12 illustrates test set-up.

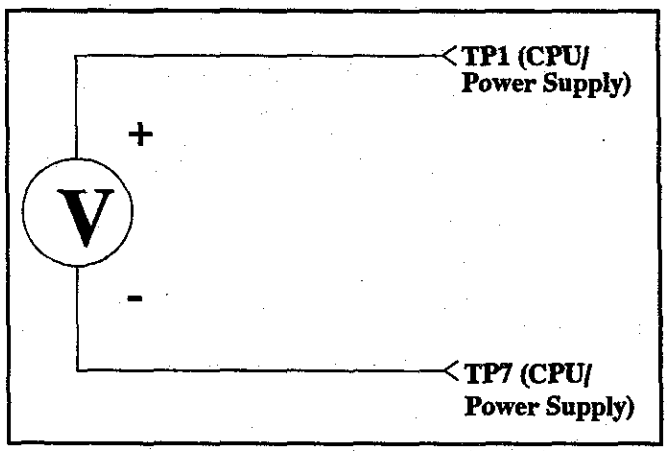

Figure 5-10
13.8 VDC Check. Power cord Plugged into AC and pump turned on

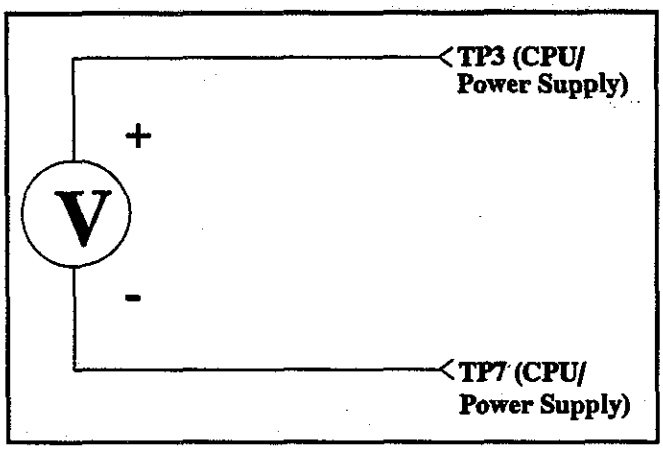

Figure 5-11
5.00 VDC Check. Power cord plugged into AC and pump turned on.

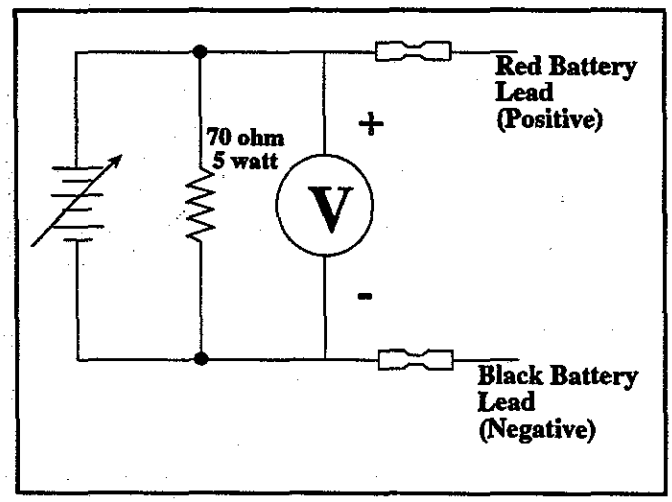

Figure 5-12
Schematic diagram of low battery alarm verification set-up. Power cord should be plugged in and pump turned on.

Apply 12.5 volts to battery leads and turn pump on. Load pump with a fluid filled cassette and enter a rate of 125 mL/h (99.9 mL/h on Micro 3100). Press ***Run*** and slowly begin to decrease DC voltage supplied while pump is operating. Verify activation of low battery alarm (`Low battery/ plug in cord` in Message Display with ***non-insistent*** audio alarm) when voltage reaches 11.6 ±.2 volts.

B. Dead Battery Alarm

The Model 3000 and Micro 3100 pumps continue to operate at the selected rate following a low battery alarm. Silence is pressed to silence ***non-insistent*** audio alarm. Battery indicator continues to flash if pump remains in operation under battery power. A dead battery alarm is activated when battery power drops below 11.0 volts (approximately 1/2 hour).

The dead battery alarm trip point may be verified following activation of initial low battery alarm as previously described in A, above. Press ***Silence*** to reset ***non-insistent*** audio alarm. Continue gradual reduction of DC power supply voltage. A dead battery alarm (`Battery too low/plug in cord` in Message Display and ***insistent*** audio alarm) must activate at 11.0 volts (±.2 volts).

4. Cam Housing Switch Adjustment

Reference Section 4.4 for proper cam switch function.

The cam housing switch acts in conjunction with the safety clip switch to monitor cassette loading/unloading and safety clip loading. The cam switch is activated when the door is closed and the cam housing moves forward to interface with the cassette housing. The cassette housing causes the switch to open when the door is closed. The switch closes when the door is open.

Calibration of the cam switch function is performed by adjusting the position of the switch's mounting bracket. To accomplish this, disassemble front housing (5.9, step 3) and remove pump assembly (5.9 step 8).

Once pump assembly is removed, slotted link must be disconnected from upper long link/short link connection (see Figure 5.13). Place a 0.010 inch feeler gauge between cassette housing pad and cam housing at the end farthest from the motor, and lock housings into position by pushing outward on long and short connecting links. Loosen 2 screws holding switch bracket to cam housing, and adjust position of bracket so switch just activates. Use an ohm meter to determine switch activation. Switch must activate with a gap of 0.010 between cassette housing and cam housing, with a tolerance of ±0.005 inches. Re-tighten screws.

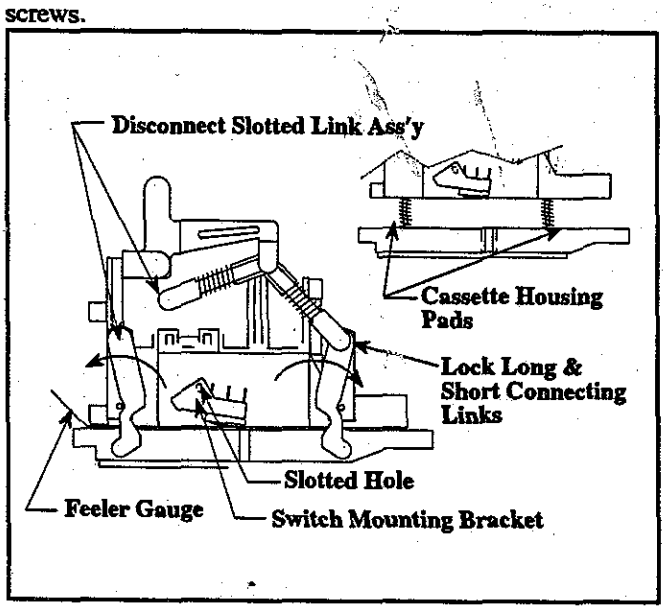

Figure 5-13
Cam Switch Adjustment

Insert a 0.016 inch feeler gauge between cassette housing pads and cam housing, and verify switch does not activate. If the switch activates, the gap should be reset to a distance of less than 0.010.

5. Occlusion Alarm Adjustment

NOTE
Lower tubing should be placed at the same level as the base of the pump when adjusting the the occlusion alarm.

The occlusion alarm is produced when pressure develops in the cassette and drives the pressure transducer's A to D conversion to an alarm threshold. The output to the A to D converter is calibrated using trim pots R439 and R448 at the bottom of the door assembly.

The infusion pumps should be operated against a regulated compressed air source to verify or calibrate the occlusion alarm thresholds. The pressure source must be both adjustable and measurable (see Section 5.3, number 1, and Figure 5-14).

To calibrate the occlusion alarm:

Plug pump into an AC outlet, turn pump off, press and hold ***Options***, then press ***On/Off***. At "`Enter ID`" screen, enter *3031*. At "`Enter Password`" screen, enter *7867*. Press ***Options*** until "`Pressure Calibrate`" screen shows.

Install an administration set and connect regulated compressed air source to lower tubing. Apply 2.4 psi of pressure, enter a rate of 100 mL/h (99.9 on Micro 3100), and press ***Run***. Verify fluid movement in tubing, then adjust potentiometer R448 (rightmost pot when facing front of pump) until A to D value in Message Display is 45.

NOTE
To gain access to the adjust pots, the protective label must be removed. A new label should be installed after calibration is complete (part # 78-8092-0841-2).

Increase back pressure to 10 psi, and adjust potentiometer R439 (center pot) until A to D value in Message Display is 205.

Repeat 2.4 psi and 10 psi adjustments until displayed A to D values are stable without further need of adjustment at 45 ±1 and 205 ±1, respectively.

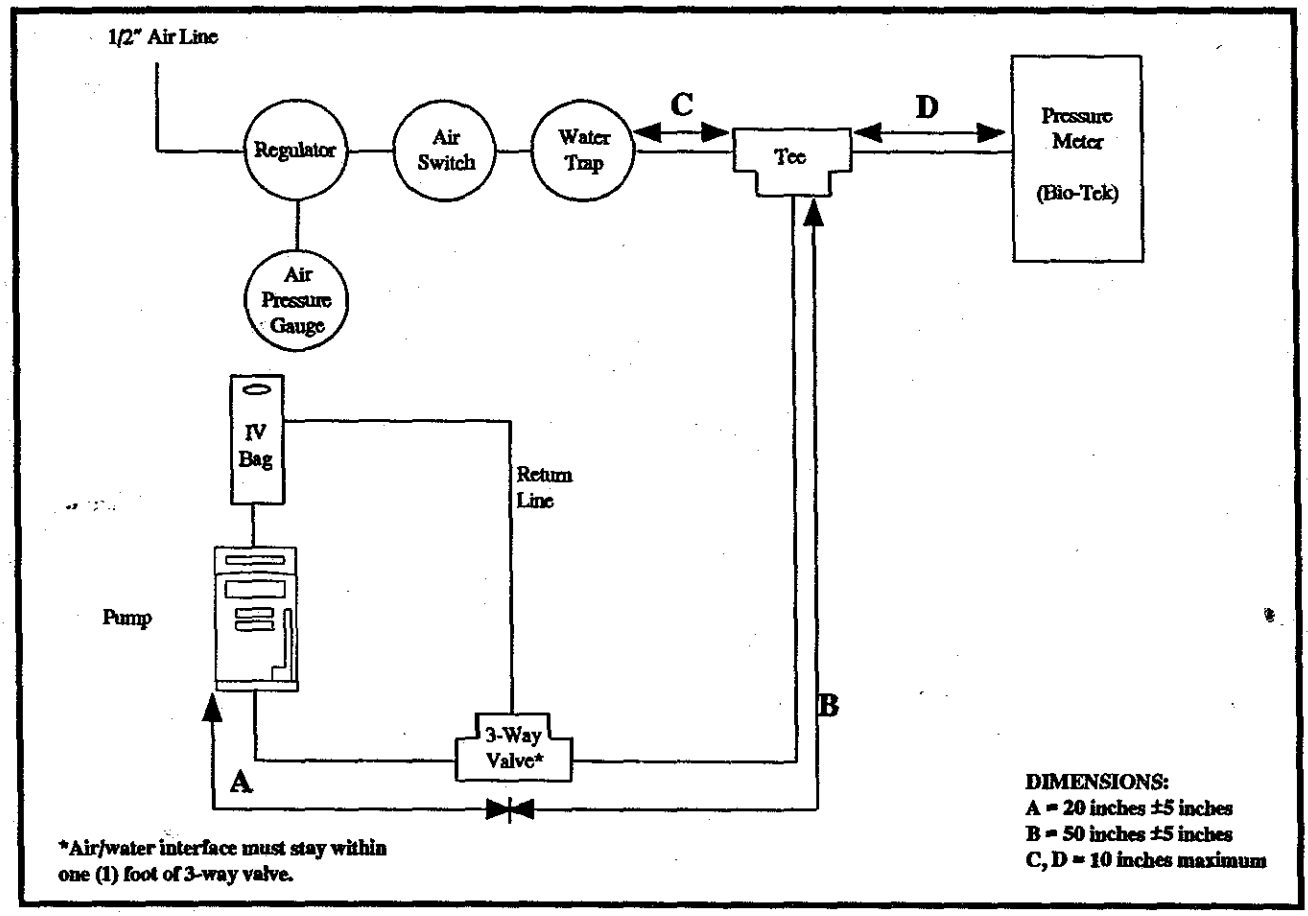

Figure 5-14
Occlusion alarm adjustment set-up.

6. Empty Bag Contacts Adjustment

NOTE
Before calibrating the empty bag contact, verify that the top piston moves freely and is not impeded by dried solution, etc.

The empty bag contacts consist of a rigid wire contact and a spring contact. The wire contact moves with the upper piston as its drive (metering) cam turns. The spring contact is mounted to the cam housing. Its position is calibrated so the wire contact briefly touches the spring contact once during each revolution of the cam shaft (see Figure 4-3).

The cam which drives the upper piston is the metering cam. The perimeter of the metering cam is designed with two depressions (see Figure 5-15). One depression is more pronounced and is called the major depression. The other is the minor depression. The empty bag contacts must touch only when the upper piston shaft is in contact with the major depression.

Calibration and adjustment of the empty bag contacts require that the front housing be disassembled (see Section 5.9, number 3). Calibration of the empty bag contacts is accomplished by turning the dog point set screw located on the cam housing just above and to the rear of the cam switch.

Calibrate position of spring contact as follows:

- Turn pump off and partially disconnect wire assembly and connector P102 on I/O board.
- Connect an ohmmeter between TP8 (ground potential) and pin 6 of connector P102 (pin 1 is at top).
- Manually rotate cam shaft while observing ohmmeter. Upper piston is spring loaded to out position. It must be held inward so that its shaft maintains contact with metering cam during rotation.
- Adjust dog point set screw until empty bag contacts perform as specified on Figure 5.15.

Empty bag calibration should be tested by installing a fluid filled, non-checkvalve set and operating the pump at a rate of 999 mL/h (99.9 mL/h on Micro 3100), with the fluid level in the bag at 6 5/8 inches above the top of the pump (the top of the pump is defined as the flat area below the handle). The pump should run for 6 mL without a "No flow above pump" alarm. If an alarm occurs under these conditions, the empty bag contact should be adjusted for less sensitivity by turning the dogpoint set screw clockwise.

If the pump runs for 6 mL under the above conditions, lower the solution level to 2 5/8 inches above the pump (3/8 inches above top of Micro 3100). You should get a "No flow above pump" alarm before the pump infuses 3 mL.

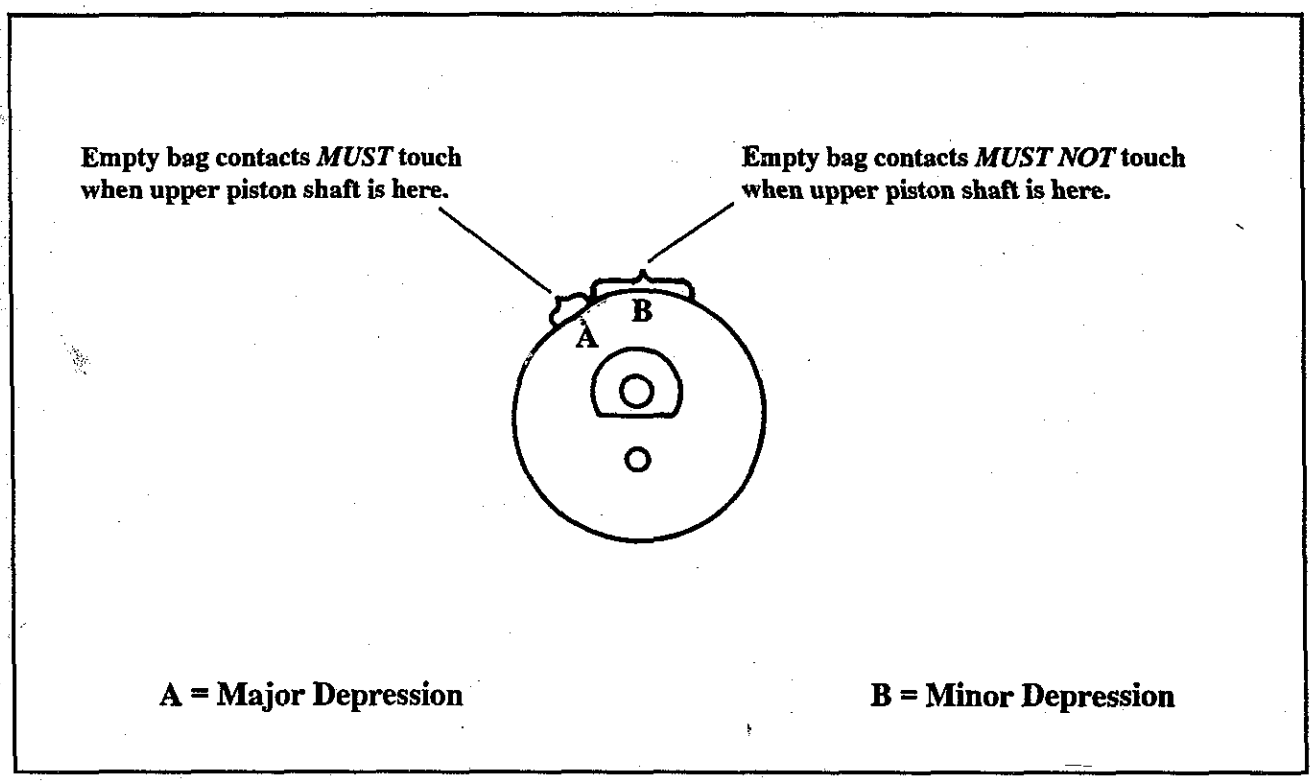
Empty bag contacts *MUST* touch when upper piston shaft is here.
Empty bag contacts *MUST NOT* touch when upper piston shaft is here.
A
B
A = Major Depression
B = Minor Depression

Figure 5-15
Metering Cam as Related to Empty Bag Contacts

Table 5-3 Recommended Spare Parts List

Description	Model 3000	Model 3100
Battery (12v,1.3Ah/20HR)	26-1011-4159-1	same
Battery Fuse (1A time delay)	N/A	same
AC Fuse (200mA time delay)	26-1011-5378-6	same
Power Cord	78-8092-5142-0	same
Motor/Swingarm Assembly	78-8095-2153-3	same
Keypad	78-8069-6497-5	same
Keypad Overlay	78-8069-6498-3	78-8077-8334-1
Cam Switch	26-1006-5104-6	same
Pressure Plate Assembly	78-8095-2165-7	same
Fastener Kit	78-8095-2299-4	same
I/O Board	78-8068-3286-7	same
Keypad Board	78-8069-6494-2	same
RS232 Board	78-8077-8531-2	same
CPU/Power Supply Board	78-8092-5267-5	same
Power Cord Label	78-8095-2214-3	same
Power Cord Cover	78-8092-4863-2	same
Emitter/Detector Kit	78-8061-4171-5	same
Left Pole Saver Rail	78-8077-8558-5	same
Right Pole Saver Rail	78-8095-2323-2	same

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Section 6: Parts Lists and Diagrams

Model 3000 and Micro 3100

6.1 Mechanical and Structural Parts

The following tables and figures identify mechanical and structural parts of the 3M Model 3000 and Micro 3100 Volumetric Infusion Pumps. Current parts and price lists are available from 3M Infusion Therapy Customer Service (see Section 5.1).

NOTE
Pump specifications and parts of the 3M infusion pumps may be changed without notice. Updated tables, figures, and any instructions required for this manual will be mailed to you as required for proper service of these products.

CAUTION
Because the circuit boards used in the Model 3000 and Micro 3100 Infusion Pumps are primarily surface mount technology, component level repair is not recommended.

Table 6-1 Pump Assembly Parts

Reference Designation From Figure 6-1	Description	Model 3000	Micro 3100
1	Cassette Housing Assembly	78-8092-4839-2	same
2	Cassette Washer - Nylon	26-1011-4189-8	same
3	Emitter/Detector Assembly	78-8061-4171-5	same
4	Clip Guide	78-8077-8384-6	same
5	Cassette Shaft	78-8077-8284-8	same
6	E-Ring (1/8")	N/A	N/A
7	Modified Link - Long	78-8092-4970-5	same
8	Link - Short	78-8077-8278-0	same
9	Ribbon Cable Guide	N/A	N/A
10	Cable Clamp	N/A	N/A
11	Tapered Cam Shaft	78-8077-8274-9	same
12	Double Back Foam Tape	78-8005-3202-6	same
13	Cam Housing	78-8077-8275-6	same
14	Valve/Piston Coil Spring	78-8061-4232-5	same
15	Flat Washer	N/A	N/A
16	C-Ring (1/16")	N/A	N/A
17	Spring	78-8637-2811-6	same
18	Empty Bag Contact	78-8061-4230-9	same
19	Empty Bag Contact	78-8061-4225-9	same
20	Bearing Flange	78-8077-8347-3	same
21	Spacer Ring	78-8079-5879-4	same
22	Molded Cam Assembly	78-8079-5989-1	same
23	Special #10 Flat Washer	78-8079-6410-7	same
24	I/O Board Wiring Harness	78-8092-0789-3	same
25	Switch Plate	78-8095-2289-5	same
26	Snap Switch	26-1006-5104-6	same
27	Pivot Link Assembly	78-8092-4995-2	same
28	Switch Bracket Clip Assembly	78-8095-2212-7	same
29	Spring	78-8003-8346-1	same
30	Flat Valve Assembly	78-8092-4945-7	same
31	Modified Shaft/Molded Piston	78-8092-4855-8	same
32	Shaft/Molded Piston	78-8079-6005-5	same
33	Empty Bag Spring	78-8061-4288-7	same
34	Optical Filter	78-8079-5958-6	same

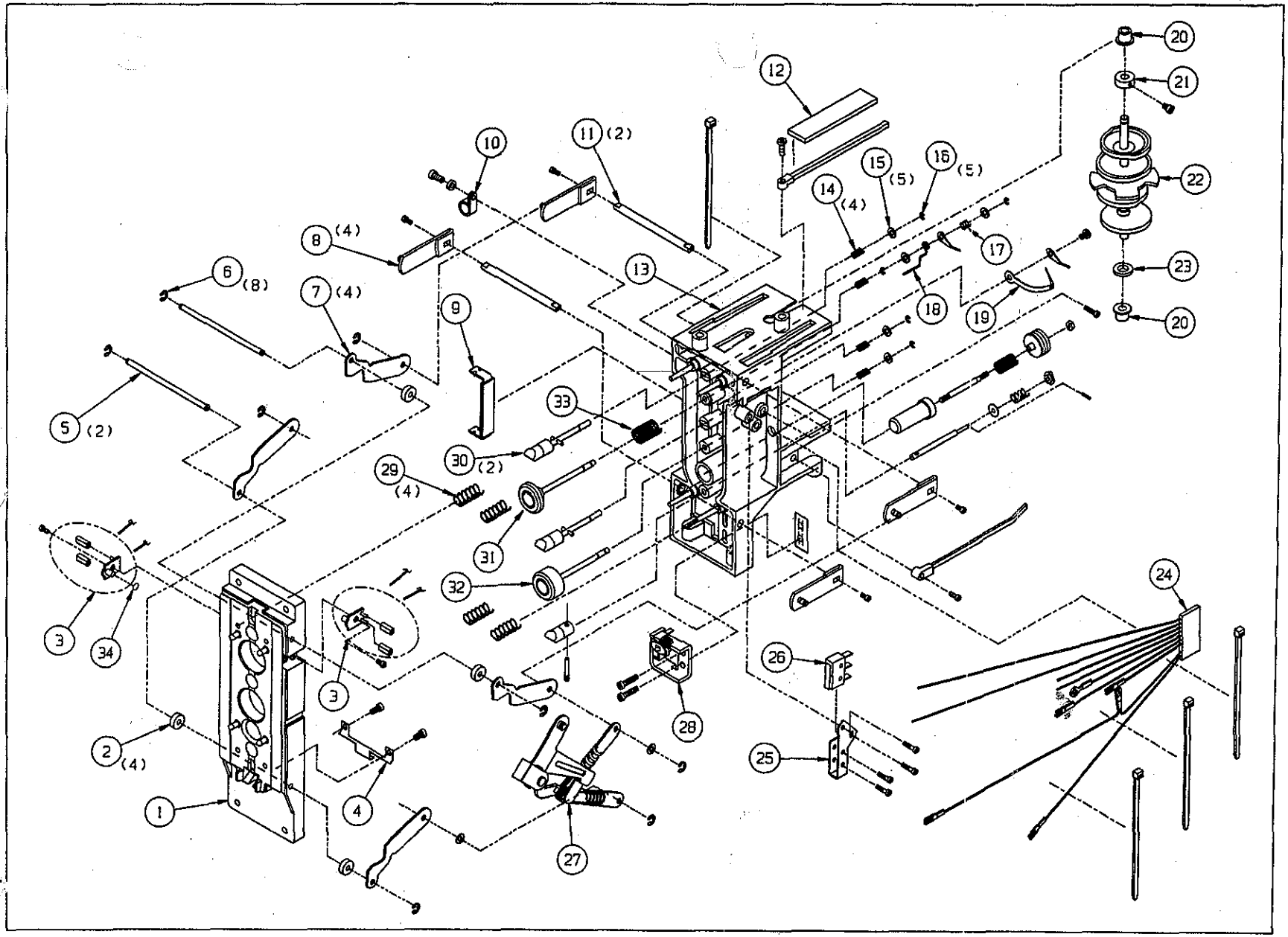

Figure 6-1
Pump Assembly

Table 6-2 S\ garm Assembly Parts

Reference Designation From Figure 6-2	Description	Model 3000	Micro 3100
1	Motor Assembly	78-8092-0788-5	same
2	Mount	78-8077-8539-5	same
3	Torsion Spring	78-8077-8545-2	same
4	Swingarm Bushing	78-8092-0824-8	same
5	Swingarm	78-8077-8540-3	same
6	Roller - Swingarm	78-8092-5208-9	same
7	Screw - Shoulder	78-8092-5207-1	same
8	E-Ring	78-8656-3998-9	same
9	Spring	26-1011-4291-2	same
10	Set Screw (6-32 x 1/8)	N/A	same
11	Swing Damper	78-8092-5128-9	same
12	Coupler, Gear	78-8077-8544-5	same

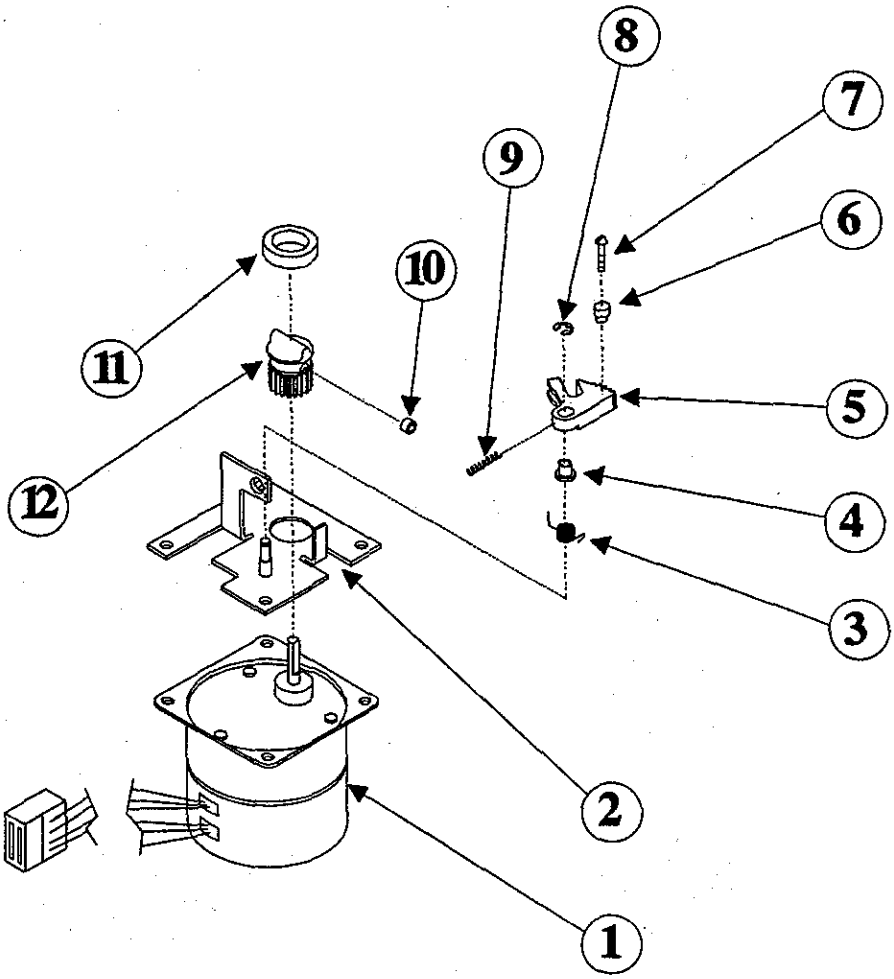

Figure 6-2
Swingarm Assembly

Table 6-3 Front/Rear Housing AssemblyParts

Reference Designation From Figure 6-3	Description	Model 3000	Micro 3100
1	Keypad Overlay	78-8069-6498-3	78-8077-8334-1
2	Keypad	78-8069-6497-5	same
3	Door - Front	78-8077-8229-3	same
4	Top Hinge Bracket	78-8077-8237-6	same
5	Door Rear	78-8092-5146-1	same
6	Upper Hinge Bracket	78-8077-8254-1	same
7	ESD Shield	78-8077-8426-5	same
8	SPI Ribbon Cable Assembly	78-8092-0720-8	same
9	Front Housing	78-8077-8250-9	same
10	Gasket	78-8071-7692-6	same
11	Pump Assembly	See Figure 6-1	same
12	Rear Housing	78-8092-5082-8	same
13	Bag Pin	78-8077-8689-8	same
14	Jack Panel Label	78-8092-4997-8	same
15	Audio Volume Knob	26-1011-4322-5	same
16	Modular Connector Button	78-8077-8550-1	same
17	Left Modular Connector Rail	78-8077-8558-5	same
18	Modular Connector Frame	78-8077-8556-9	same
19	Pole Clamp Assy (see Table/Figure 6-4)	78-8092-0847-9	same
20	Pole Clamp Label	78-8092-0846-1	same
21	Right Modular Connector Rail	78-8095-2201-0	same
22	Left Modular Connector Arm	78-8077-8562-7	same
23	Right Modular Connector Arm	78-8077-8501-9	same
24	Test Post	78-8092-5249-3	same
25	Power Cord/Strap Assembly	78-8092-5149-0	same
26	Power Cord Cover	78-8092-4863-2	same
27	Battery Door	78-8077-8249-1	same
28	Equipotential Label	78-8092-5108-1	same
29	Foot Pad	26-1007-1170-9	same
30	Test Stud	78-8092-5250-1	same
31	Gasket	78-8086-5903-9	same
32	Protective Earth Label	78-8092-0821-4	same
33	Bracket	78-8092-4843-4	same
34	Battery Wire Harness	78-8092-0772-9	same
35	Battery LCR (12V, 1.3Ah/20HR)	26-1011-4159-1	same
36	Battery Clamp	78-8077-8252-5	same
37	Battery Pad	78-8092-0709-1	same
38	Fuse Label	78-8092-0844-6	same
39	Motor/Swingarm Assembly (see Table/ Figure 6-2)	78-8095-2153-3	same
40	T - Brace	78-8095-2254-9	same
41	Connecting Link	78-8095-2291-1	same
42	Frame Assembly	78-8092-0834-7	same
43	Gasket	78-8092-5198-2	same
44	Handle Stop Assembly	78-8092-4966-3	same
45	Arm Guide	78-8077-8243-4	same
46	Lower Hinge Assembly	78-8095-2120-2	same
47	Inner Arm Assembly	78-8092-4967-1	same
48	Outer Handle	78-8077-8242-6	same
49	Stop Spring	26-1002-3418-1	same
50	Pressure Plate Assembly	78-8095-2165-7	same
51	Spring Support	78-8077-8238-4	same
52	Pressure Plate Spring	78-8092-0827-1	same
53	Power Cord Label	78-8095-2214-3	same
54	Modular Connector Spring	26-1011-5821-5	same
55	Lower Door Recess Label	78-8092-0841-2	same
	pressure plate cover	78-8095-2929-6	

Display Kit
3100
115.00
0150-0522

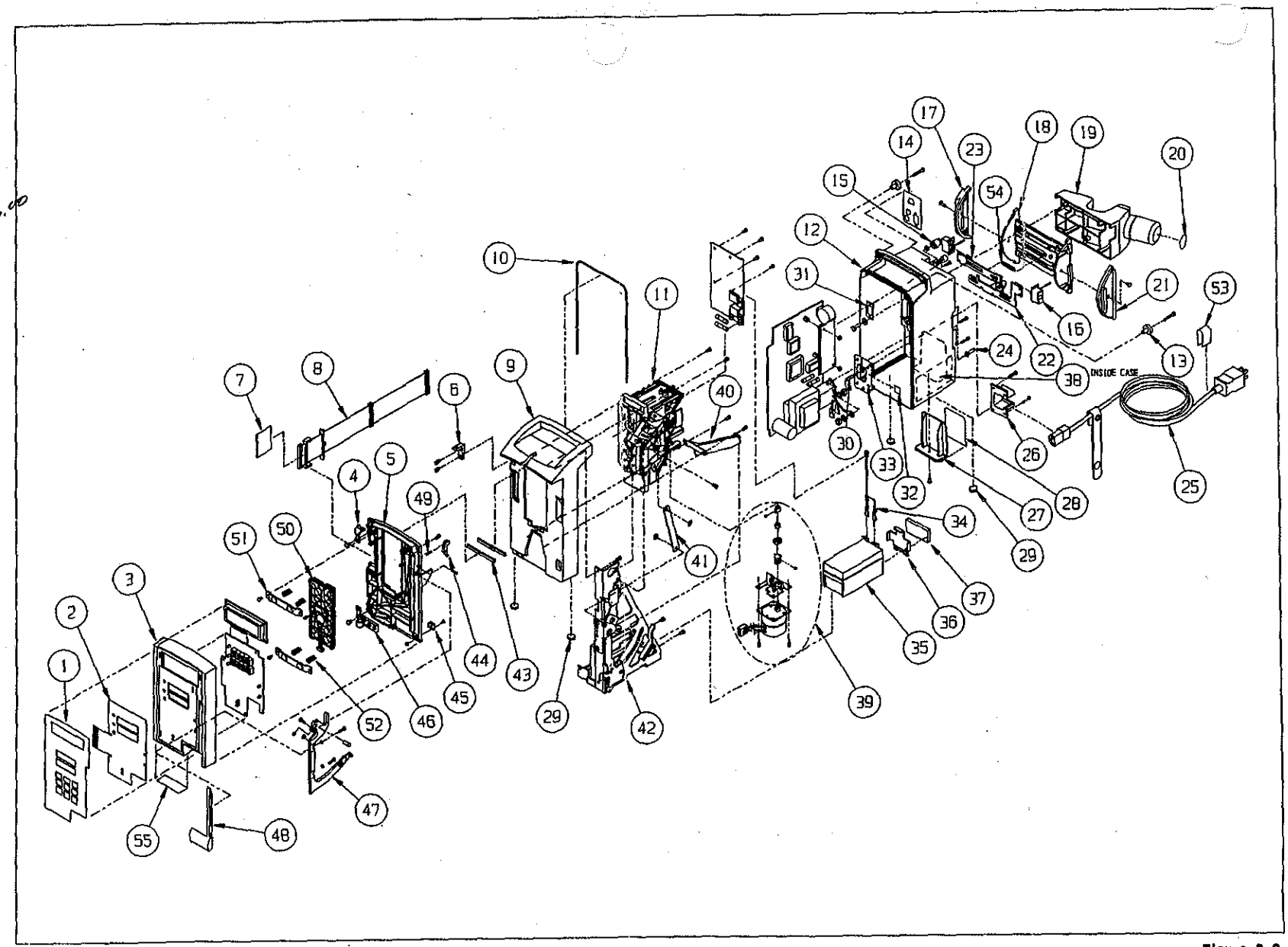

Figure 6-3
Front/Rear Housing Assembly

Table 6-4 Pole Clamp Assembly Parts

Reference Designation From Figure 6-4	Description	Model 3000	Micro 3100
1	Pole Clamp Base	78-8077-8555-1	same
2	Bottom Hub	78-8077-8554-4	same
3	Top Hub	78-8077-8553-6	same
4	Pole Clamp Knob	78-8077-8552-8	same
5	Pole Clamp Nut	78-8077-8244-2	same
6	Pole Clamp Stud	78-8077-8564-3	same
7*	Screw (6-32 x 7/16 PHMS)	N/A	same
8*	Screw (8-32 x 3/4 PHMS)	N/A	same
9	Screw (8-32 x 1/2 PHMS)	N/A	same
10	#6 Lockwasher	N/A	same
11	Screw (6-32 x 1/4 FMS)	N/A	same
12	Washer (.276 ID x .5 OD x .060 THK)	N/A	same
13	Roll Pin, 1/8" x 1/2"	18-9260-8515-2	same
14	Retaining Ring	26-1002-2895-1	same

*Apply Locktite 271 to screw threads when assembling.

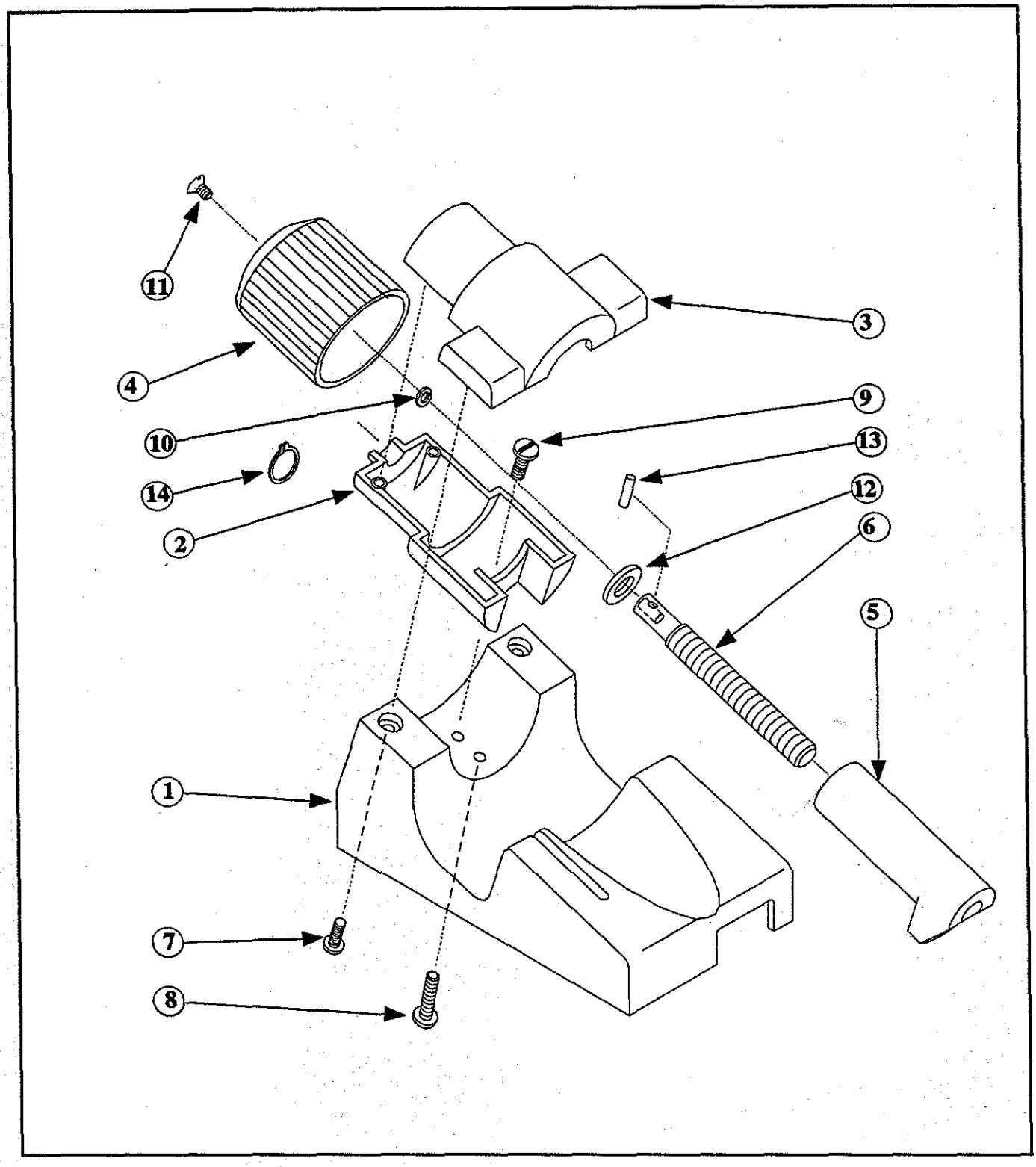

Figure 6-4
Pole Clamp Assembly

Table 6-5 Display PWB Parts (78-8069-6494-2)

Reference Designation	Description
U401	IC, EL Backlighting
U402	Socket, 44-Pin PLCC, CPU3
U403	IC, Octal D-Type Latch
U404	IC, 4 To 16 Decoder
U405, U406	IC, 7 Section Invert, Darlington
U407	IC, Low Power Voltage Regulator
U408	IC, 11 Input A/D Converter
U409	IC, Low Power Quad Op Amp
U410	IC, 8 Stage Shift/Store Register
U411	IC, 8 Bit 3-State Shift Register
U412	IC, 8 Bit 3-State Shift Register
U413	IC, Hex Inverting Schmitt Trigger
U414	IC, Comparator
U415	IC, 5.0Volt Reference
X401	Crystal, 4.0 MHZ, HC-49/US, PARL.
D401-405	Diode, High Speed Switching
DS401-404, DS406-409	Display, 7 Segment Red LED
DS405, DS410	Display, 7 Segment Red LED
DS411, DS413, DS416	LED, Green, T-1
DS412, DS415	LED, Yellow, T-1
DS414	LED, Red, T-1
Q401	Transistor, NPN
Q402	Transistor, PNP
PS401	Photosensor
R401, R418, R422, R425, R461, R465, R466, R470, R473, R472	Resistor, 1/8 Watt, 5%, size 1206
R402, R439, R448	Potentiometer, 1/2 Watt, 20 Turn
R403, R412	Resistor, 4.7K, 5%, size 1206
R404-411, R453-460	Resistor, 150Ω, 5%, size 1206
R413-415, R419-421	Resistor, 100K, 5%, size 1206
R416, R434	Resistor, 0Ω (Zero Ohm Jumper)
R417, R435, R440	Resistor, 499K, 5%, size 1206
R423	Resistor, 10M, 5%, size 1206
R424	Resistor, 330Ω, 5%, size 1206
R426, R469	Resistor, 1K, 5%, size 1206
R427	Resistor, 249Ω, 1%, size 1206
R428	Resistor, 1.33K, 1%, size 1206
R462	Resistor, Do Not Install
R430	Resistor, 287K, 1%, size 1206
R463, R464, R467, R474	Resistor, 1M, 5%, size 1206
R436, R441	Resistor, 49.9K, 1%, size 1206
R429, R437	Resistor, 576K, 1%, size 1206
R438	Resistor, 8.06K, 1%, size 1206
R422	Resistor, 84.5K, 1%, size 1206
R443, R450, R451	Resistor,10.0K, 1%, size 1206
R431	Resistor, 3.3K, 5%, size 1206
R471	Resistor, 2.80K, 1%, size 1206
R444	Resistor, 20K, 5%, size 1206
R445, R446	Resistor, 100K, 1%, size 1206
R447	Resistor, 2.94K, 1%, size 1206
R449	Resistor, 340Ω, 1%, size 1206
R468	Resistor, 47K, 5%, size 1206
RP401	Resistor Pack, 47K x 9 (P1 COM)
RP402	Resistor Pack, 100K x 13 (P14 C)
RP403	Resistor Pack, 10K x 8 Isolated
RP404, RP405	ResistorPack, 10K x 4 Isolated
C401, C403, C411, C425	Capacitor, 0.01µF, 20%, 50V 1206
C402, C408, C409, C413, C416-421, C424, C426	Capacitor, 0.1µF, 20%, 50V, 1206
C404, C405, C415	Capacitor, 22pF, 20%, 50V, 1206
C406	Capacitor, 22µF, 20%, 25V, TANT
C407, C412, C414, C427, C428, C432, C433	Capacitor, 0.001µF, 20%, 50V, 1206
C410	Capacitor,1.0 µF, 16V, Tantalum
C422, C423	Capacitor, 10pF, 20%, 50V, 1206
C429, C430, C431	Capacitor, 47pF, 20%, 50V, 1206
J401	Holes for 28 Gauge Wire
J402	Connector, Display
J403	Connector, Keypad
J404	Connector, 4-Pin, 2.5mm, Spacing
JP401	Header, 2 x 2 Pin, Dual Row
JP402	Header, 34-Pin (17 x 2)
P402	Header, 1 x 6 Pin, 0.1" Spacing
P403	Header, 2-Pin RTA M, 0.1" Spacing
	Spacer, LED Mount, 0.160"

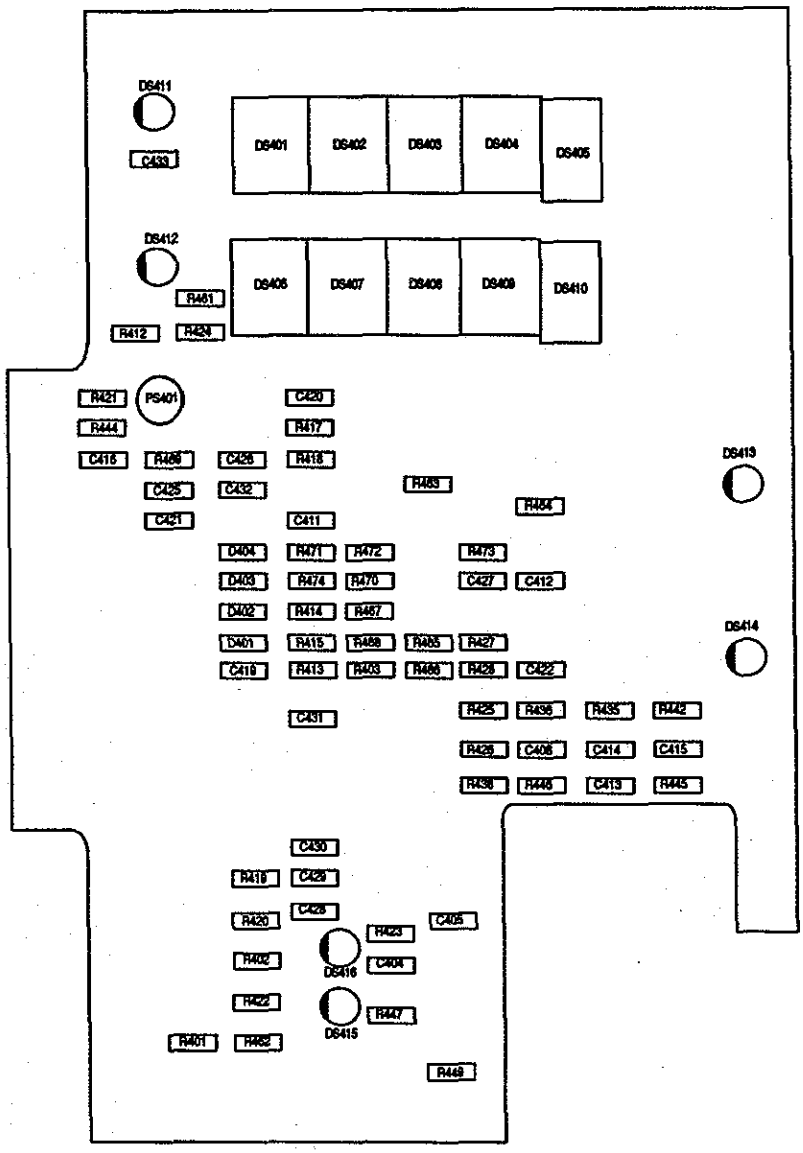

Figure 6-5A
Display PWB, Side 1

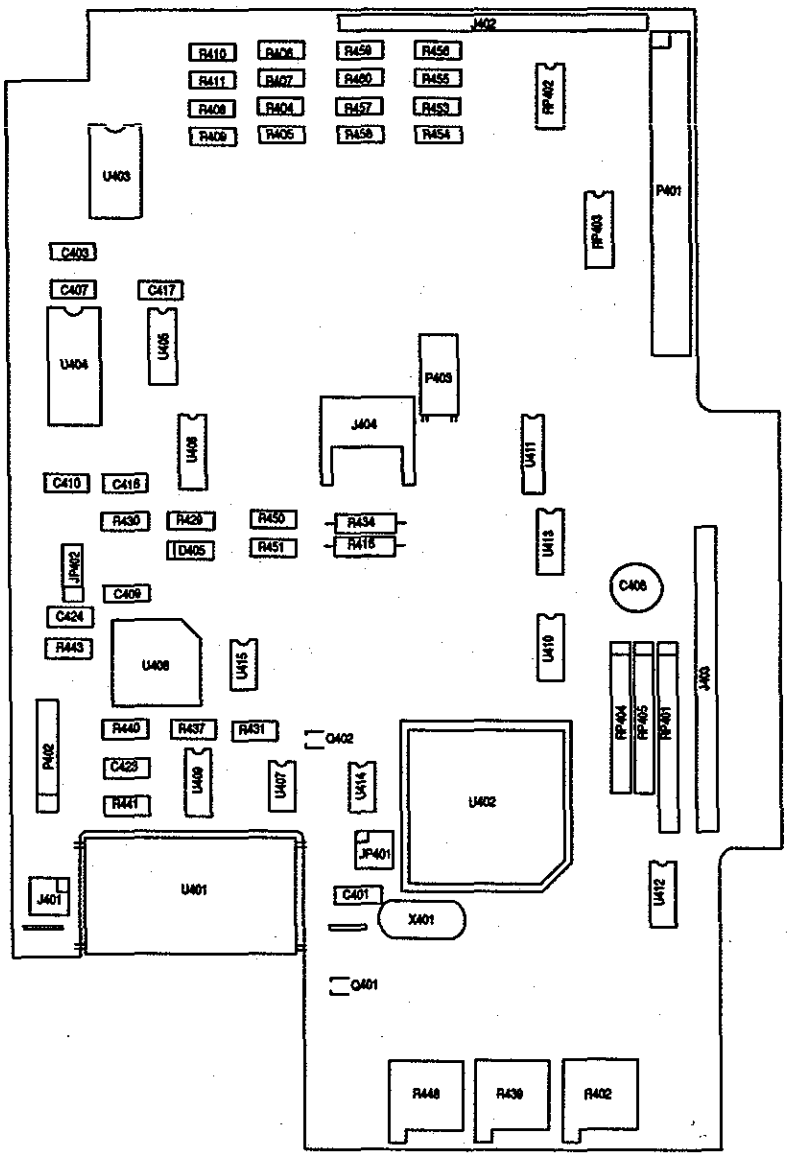

Figure 6-5B
Display PWB, Side 2

Table 6-6 Power Supply/CPU PWB Parts (78-8068-3184-4)

Reference Designation	Description
Q3-Q9, Q11-Q13	Transistor, NPN 2N4401
Q1	Transistor, PNP 2N4403
Q10	Transistor,S2008R-ND
Q2	Transistor, FET IRFR9020
D12, D13	Diode, 1N5819 SCHOTTKY
D14-D17	Diode, 1N4004
D1-D8	Diode, 1N914B
D9-D11	Diode, 1N4002
U12, U14, U25	IC4584
U4	IC4013
U1, U9	IC4049
U3	IC4001
U5	IC UP339M
U10	IC LM358D
U6, U11	IC4060
U19	IC4099
U7	IC4011
U13	IC 74HC367
U21	IC MC34164D
U23	IC MC3423D
U2, U22	IC L4962E
U15	IC MC68HC11F1FN
U18	IC MK48T12B-25
R74	Resistor, 33Ω, 1/8W, 5% Thick Film Chip
R30	Resistor, 82Ω, 1/8W, 5%, Thick Film Chip
R71	Resistor, 100Ω, 1/8W, 5%, Thick Film Chip
R38	Resistor, 240Ω, 1/8W, 5%, Thick Film Chip
R29, R80, R87, R92, R93	Resistor, 330Ω, 1/8W, 5%, Thick Film Chip
R66	Resistor, 470Ω, 1/8W, 5%, Thcik Film Chip
R46, R57, R124	Resistor, 1K, 1/8W, 5%, Thick Film Chip
R18, R24	Resistor, 2.2K, 1/8W, 5%, Thick Film Chip
R42	Resistor, 3.3K, 1/8W, 5%, Thick Film Chip
R9, R77	Resistor, 4.3K, 1/8W, 5%, Thick Film Chip
R26	Resistor, 6.2K, 1/8W, 5%, Thick Film Chip
R7, R8, R22, R64, R68, R1	Resistor, 10K, 1/8W, 5%, Thick Film Chip
R2, R73	Resistor, 15K, 1/8W, 5%, Thick Film Chip
R14, R43, R110	Resistor, 18K, 1/8W, 5%, Thick Film Chip
R16, R94	Resistor, 20K, 1/8W, 5%, Thick Film Chip
R56, R65, R69, R28	Resistor, 22K, 1/8W, 5%, Thick Film Chip
R112, R111, R34, R17, R25,R19, R21, R47, R108, R55, R79, R41, R36, R40, R5, R6	Resistor, 47K, 1/8W, 5%, Thick Film Chip
R33	Resistor, 82K, 1/8W, 5%, Thick Film Chip
R4, R12, R13, R45, R48, R122	Resistor, 100K, 1/8W, 5%, Thick Film Chip
R32, R35	Resistor,120K, 1/8W, 5%, Thick Film Chip
R78	Resistor, 200K, 1/8W, 5%, Thick Film Chip
R121, R15, R31, R44, R72, R120, R67, R88-R91, R58-R63, R109, R27, R81-R86, R95-R106	Resistor, 220K, 1/8W, 5%, Thick Film Chip
R49, R107	Resistor, 470K, 1/8W, 5%, Thick Film Chip
R37, R39, R23, R123, R125	Resistor, 1M, 1/8W, 5%, Thick Film Chip
R50	Resistor, 1.8M, 1/8W, 5%, Thick Film Chip
R20	Resistor, 10M, 1/8W, 5%, Thick Film Chip
R3, R75	Resistor, 4.75K, 1/8W, 1%, Metal Film Chip
R11	Resistor, 10.0K, 1/8W, 1%, Metal Film Chip
R76	Resistor, 11.8K, 1/8W, 1%, Metal Film Chip
R52	Resistor, 60.4K, 1/8W, 1%, Metal Film Chip
R10	Resistor, 75K, 1/8W, 1%, Metal Film Chip
R51	Resistor, 102K, 1/8W, 1%, Metal Film Chip
RN1	Resistor Network, 100K x 7 8 Pin SIP
R54	Potentiometer, 5K, 3/4 Turn (Audio)
C32	Capacitor, Ceramic, 10pF, 10%
C31	Capacitor, Ceramic, 22pF, 10%
C14	Capacitor, Ceramic, 100pF, 10%
C5, C10	Capacitor, Ceramic, 220pF, 10%
C35-C44, C27, C30, C46-C48	Capacitor, Ceramic, .001µF, 10%
C4, C9	Capacitor, Ceramic, .033µF, 10%, 50V
C12, C24-C26, C29, C33, C34, C49-C51	Capaciot, Ceramic, .01µF, 10%, 50V
C20-C23, C13, C45, C28, C16, C2	Capacitor, Ceramic, .1µF, 10%
C15, C19, C7, C17	Capacitor, 1.0µF, TANT, 25V
C3, C8	Capacitor, 2.2µF, TANT, 10V
C1	Capacitor, 3300µF, 50V, Electrolytic
C6, C11	Capacitor, 220µF, 25V, Electrolytic
C18	Capacitor, 10µF, 25V, Electrolytic
SW1	Switch DPDT Voltage Select

- CONTINUED ON NEXT PAGE -

Table 6-6 Power Supply/CPU PWB Parts (continued)

Reference Designation	Description
FL1	Component Not Inserted
U17	Socket, Surface Mount (PROM)
U8	Socket, Surface Mount (HC05)
U15-Socket	Socket, Surface Mount (HC11)
U18-Socket	Socket, 24Pin DIP, 0.600 (SRAM)
U16	Socket, 18Pin DIP, 0.300 (PIC)
L1, L2	Inductor, 250µF, .6A
T1	Transformer
U22 (Heatsink)	Screw, 4-40 x 5/16
U22 (Heatsink)	Nut w/Washer, 4-40, External Lock
S1	Switch, Push Button
Y1	Crystal, 8MHZ, w/Ground Lead
U20, U24	4MHZ Ceramic Resonator
F1, F2	Fuseholder, 5 x 20mm
JP7, JP10	Jumper, 200 Clip-Out
U22	Heatsink for U22
E1, E2	Terminal, 50 x 32mm Faston
JP1, JP2, JP3, JP5, JP6, JP11	Header, 2Pin, 0.10 CNT, 0.235 Length
JP12	Header, 3Pin, 0.10 CNT, 0.235 Length
LS1	Header, Piezo Back-To-Back Assembly
P200	34Pin Dual Row Straight
TP1-TP7	1 x 7 Header (Test Points)
K1	Nurse Call Relay
J1	1 x 8 Header (To RS232)
L3, L4	Ferrite Inductor

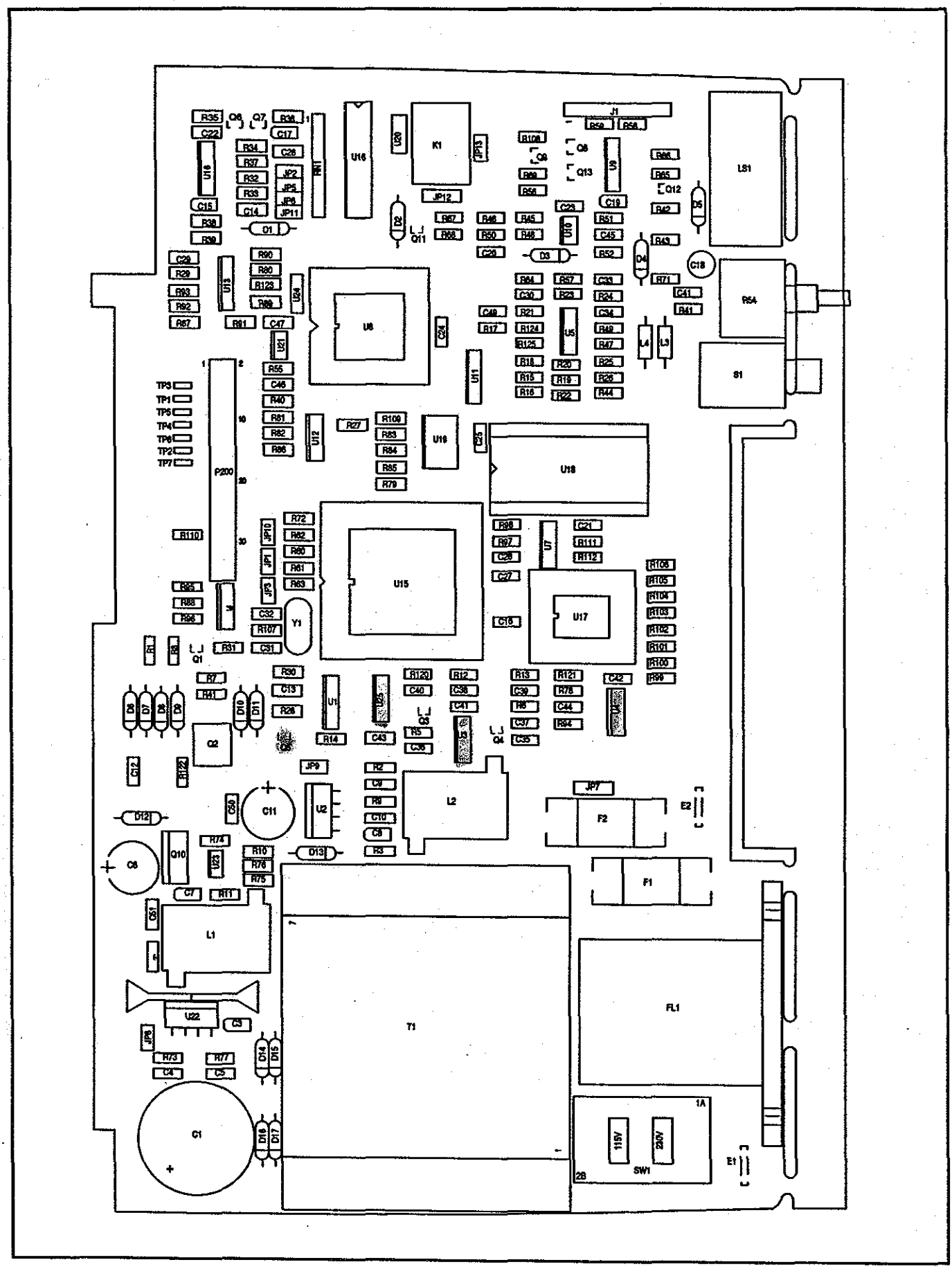

Figure 6-6
Power Supply/CPU PWB

Table 6-7 I/O PWB Parts (78-8068-3286-7)

Reference Designation	Description
Q104, Q105,Q107-Q111	Transistor, NPN 2N4401
Q102, Q103, Q106, Q112, Q113	Transistor, PNP 2N4403
Q101	Transistor, TIP32B PNP
D116	Diode, IN5819 SCHOTTKY
D106-D112, D117	Diode, 1N4004
D101, D103-D105, D113-D115, D118	Diode, 1N4148
D102	Diode, 1N4756A, 47V
U104, U107	IC 4584
U103	IC 4013
U109	IC UC3906DW Battery Charger
U101	IC EE x SX x 1042 Interrupter
U108	IC 4099
U102	IC L4940 - V10 Voltage Regulator
U105	IC HC5859
U106	IC HC173
R132, R133	Resistor, 1.0Ω, 5%, 1/8W, Thick Film Chip
R129, R130	Resistor, 1.5Ω, 5%, 1/8W, Thick Film Chip
R103, R112	Resistor, 3.6Ω, 5%, 1/8W, Thick Film Chip
R120, R124	Resistor, 10Ω, 5%, 1/8W, Thick Film Chip
R104, R137	Resistor, 200Ω, 5%, 1/8W, Thick Film Chip
R123	Resistor, 330Ω, 5%, 1/8W, Thick Film Chip
R107	Resistor, 390Ω, 5%, 1/8W, Thick Film Chip
R106, R139-R142	Resistor, 1.2K, 5%, 1/8W, Thick Film Chip
R113	Resistor, 2.2K, 5%, 1/8W, Thick Film Chip
R146, R147	Resistor, 3.3K, 5%, 1/8W, Thick Film Chip
R118	Resistor, 4.7K, 5%, 1/8W, Thick Film Chip
R108, R110, R143	Resistor, 10K, 5%, 1/8W, Thick Film Chip
R111, R114-R117, R119, R121	Resistor, 47K, 5%, 1/8W, Thick Film Chip
R105, R145, R148	Resistor, 100K, 5%, 1/8W, Thick Film Chip
R122, R126-R128	Resistor, 220K, 5%, 1/8W, Thick Film Chip
R109, R125, R144	Resistor, 1M, 5%, 1/8W, Thick Film Chip
R134	Resistor, 39.2K, 1%, 1/8W, Metal Film Chip
R138	Resistor, 69.8K, 1%, 1/8W, Metal Film Chip
R135	Resistor, 130.0K, 1%, 1/8W, Metal Film Chip
R136	Resistor, 511.0K, 1%, 1/8W, Metal Film Chip
R102	Resistor, 1.0K, 5%, 1/2W
R101	Resistor, 560Ω, 5%, 1W, Wire Wound
R131	Component Not Inserted
C104, C106, C109, C111, C119	Capacitor, Ceraminc, .001µF, 10%
C108, C110, C114	Capacitor, Ceramic, .01µF, 10%, 50V
C107, C113, C115-C118	Capacitor, Ceramic, .1µF, 10%
C102	Capacitor,22µF, 25V, Alum. Electrolytic
C103	Capacitor, 120µF, 25V, Alum. Electrolytic
C101	Capacitor, 470µF, 25V, Electrolytic
C105, C112	Capacitor, 1.0µF, 25V, TANT
F101, F102	Fuseholder, 5 x 20 mm
U102 (Heatsink)	Heatsink for U102
P102	Header, 10 Pin SIP (Wire Harness)
P103	Header, 8 Pin DIP (Motor)
P104	Header, 2 Pin Rt Angle (Battery)
P101	34 Pin Dual Row Straight
Q101 (Heatsink)	Heatsink Bottom (Q101)
TP1 - TP8	1 x 8 Header (To RS232)
Q101 (Heatsink)	Heatsink Top
Q101, U102 (Screw)	Screw, 4-40 x 5/16
Q101, U102 Nut)	Nut With Washer, 4-40
Q101, U102 (Thermal Paste)	Thermal Paste

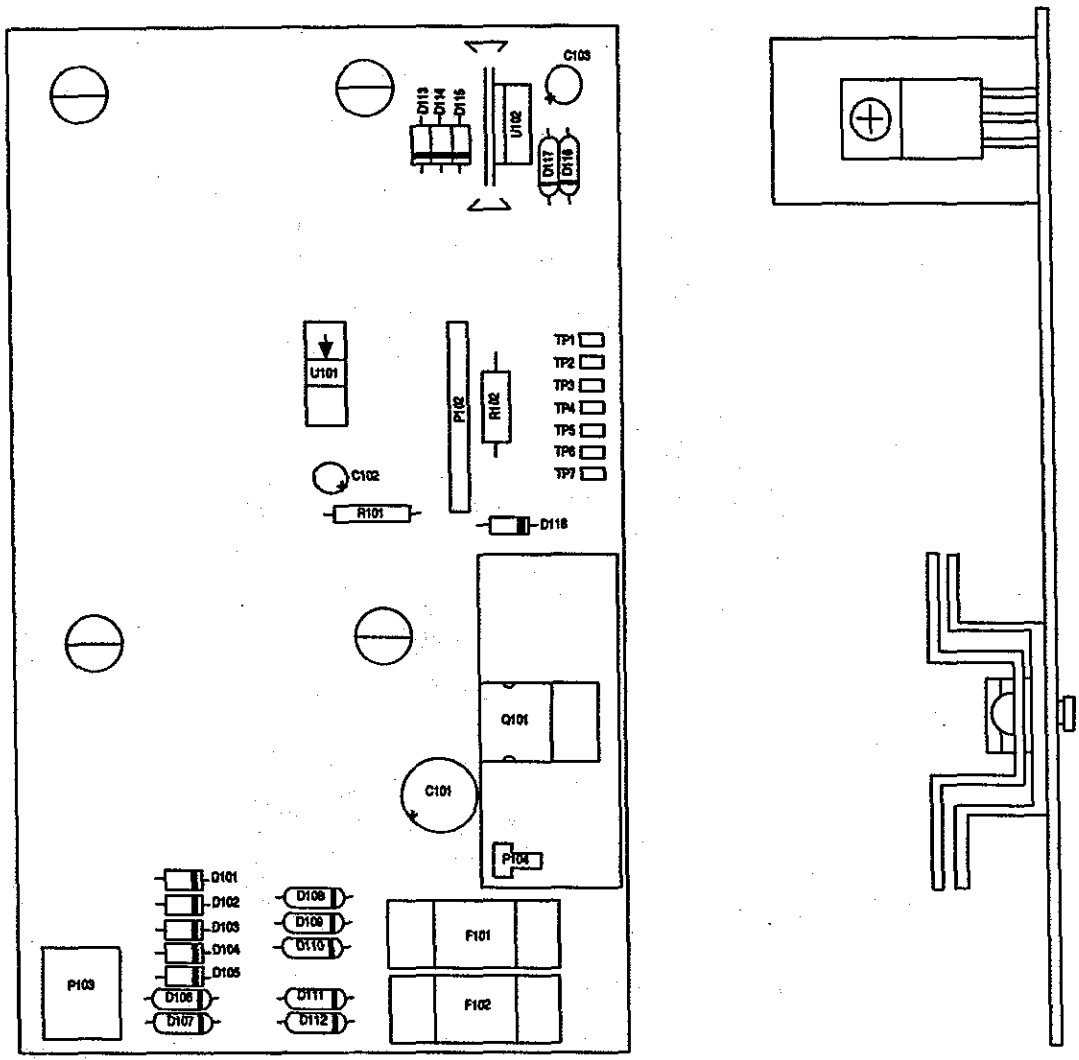

Figure 6-7A
I/O PWB, Side 1

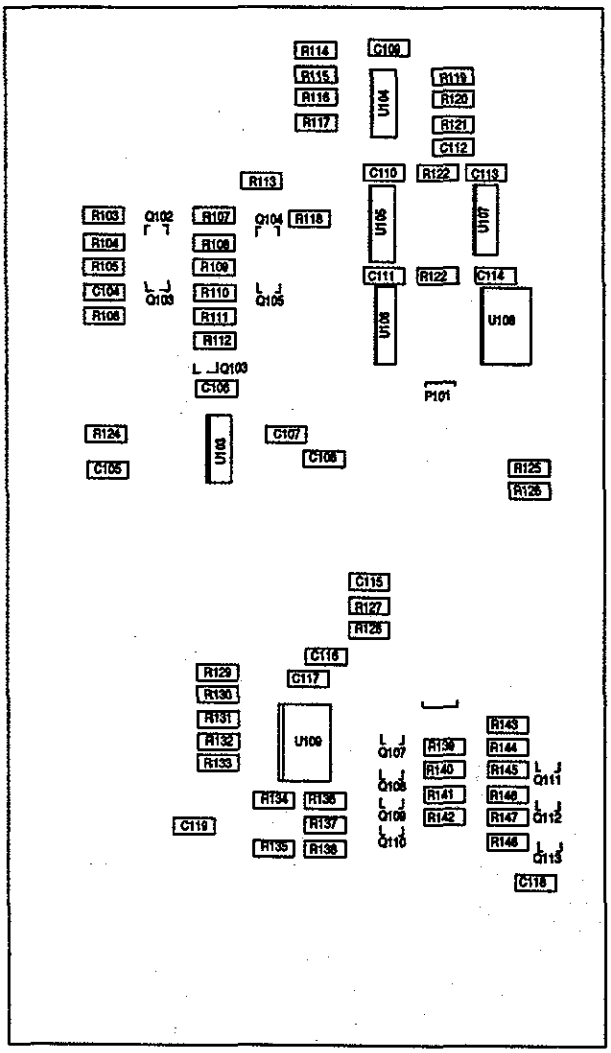

Figure 6-7B
I/O PWB, Side 2

Table 6-8 RS232 Serial Interface PWB Parts (78-8077-8531-2)

Reference Designation	Description
U701	IC, Isolated RS232 Driver/Receiver
U702	IC, Isolated RS232 Driver/Receiver
U703	IC, Micropower Voltage Regulator
U704, U705	IC, Dual Optocoupler
D701	Diode, High Speed Switching
C701, C702	Capacitor, 1µF, 35V, TANTALUM
C703, C707	Capacitor, 1µF, 16V, TANTALUM
C704	Capacitor, 4.7µF, 16V, TANTALUM
C705	Capacitor, Ceramic, 0.1µF, 20%, 50V
C706	Capacitor,Ceramic, 0.01µF, 20%, 50V
R701-R708	Resistor, 4.7K, 5%, 1/4W
R709-R711	Resistor, 470Ω, 5%, 1/4W
R712	Resistor, 100K, 5%, 1/4W
T701	Transformer, 1:1 Isolation
P701	Header (Socket), 1 x 6, 0.1"
P702	Ribbon Cable Assembly, 10 Pin

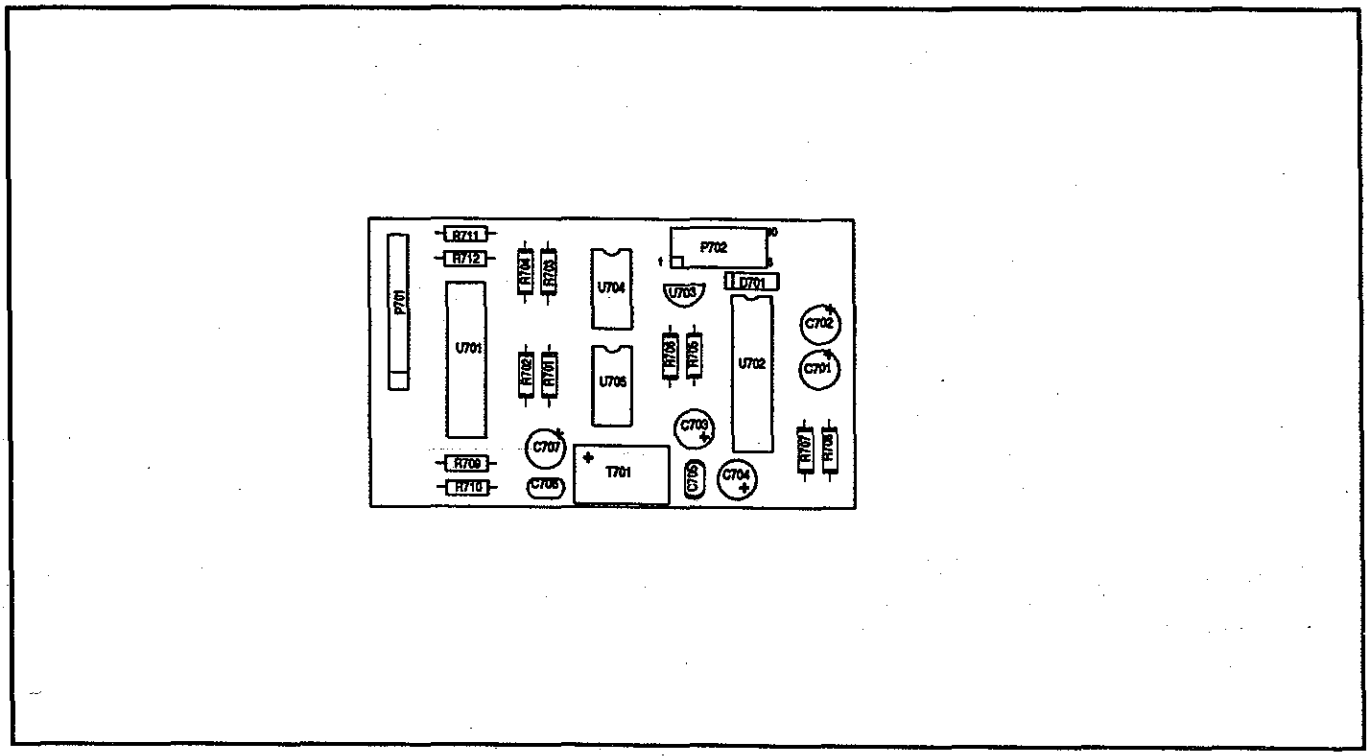

Figure 6-8
RS232 Serial Interface PWB

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Section 7: Electrical Diagrams

Model 3000 and Micro 3100

7.1 Functional Block Diagram

Figure 7-1 illustrates the overall function of the Model 3000 and Micro 3100 electrical systems. These systems are discussed in Section 4 of this manual.

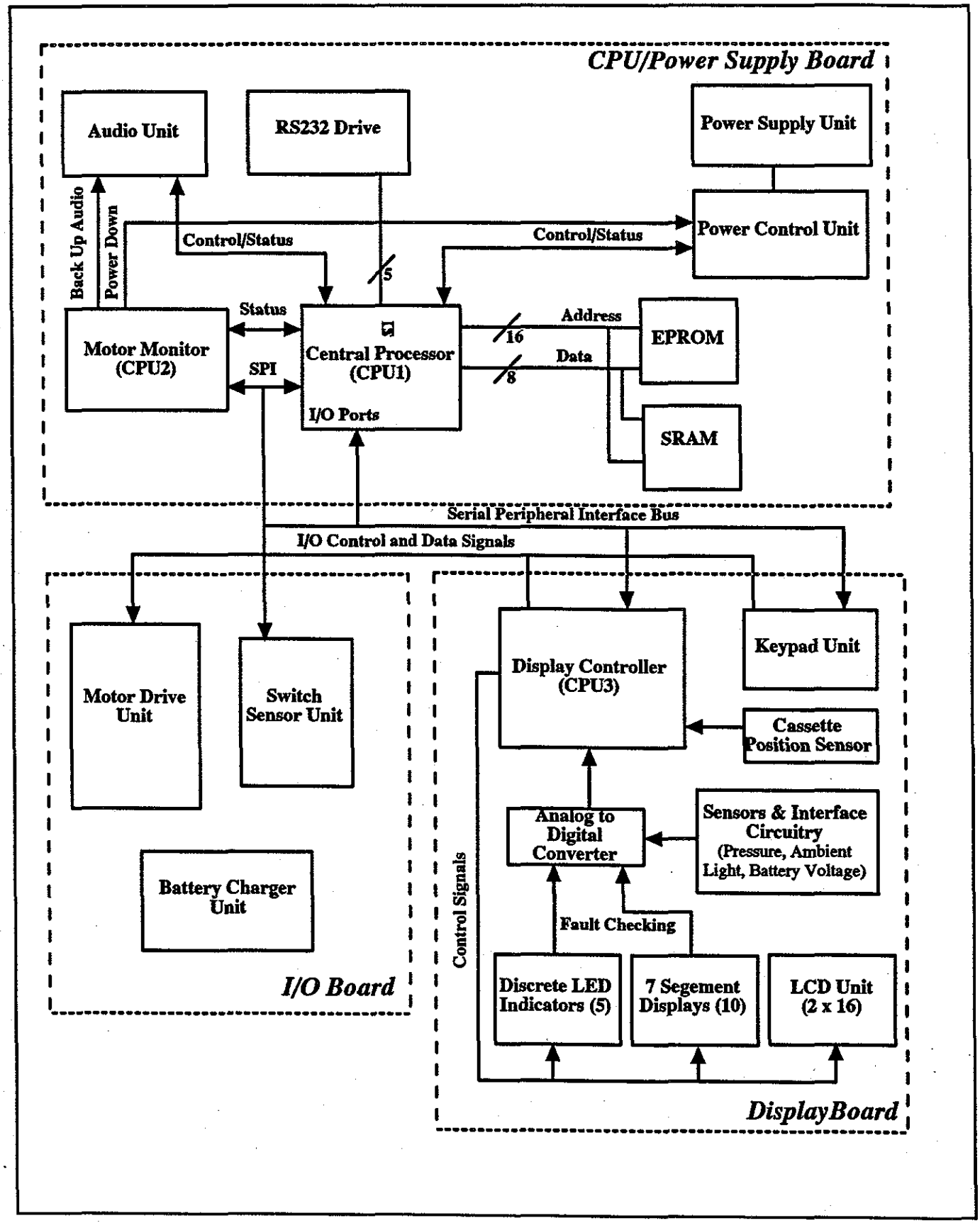


Figure 7-1
Functional Block Diagram

7.2 Power Routing

Figure 7-2 illustrates the power routing of the Model 3000 and Micro 3100 electrical systems. These systems are discussed in Section 4 of this manual.

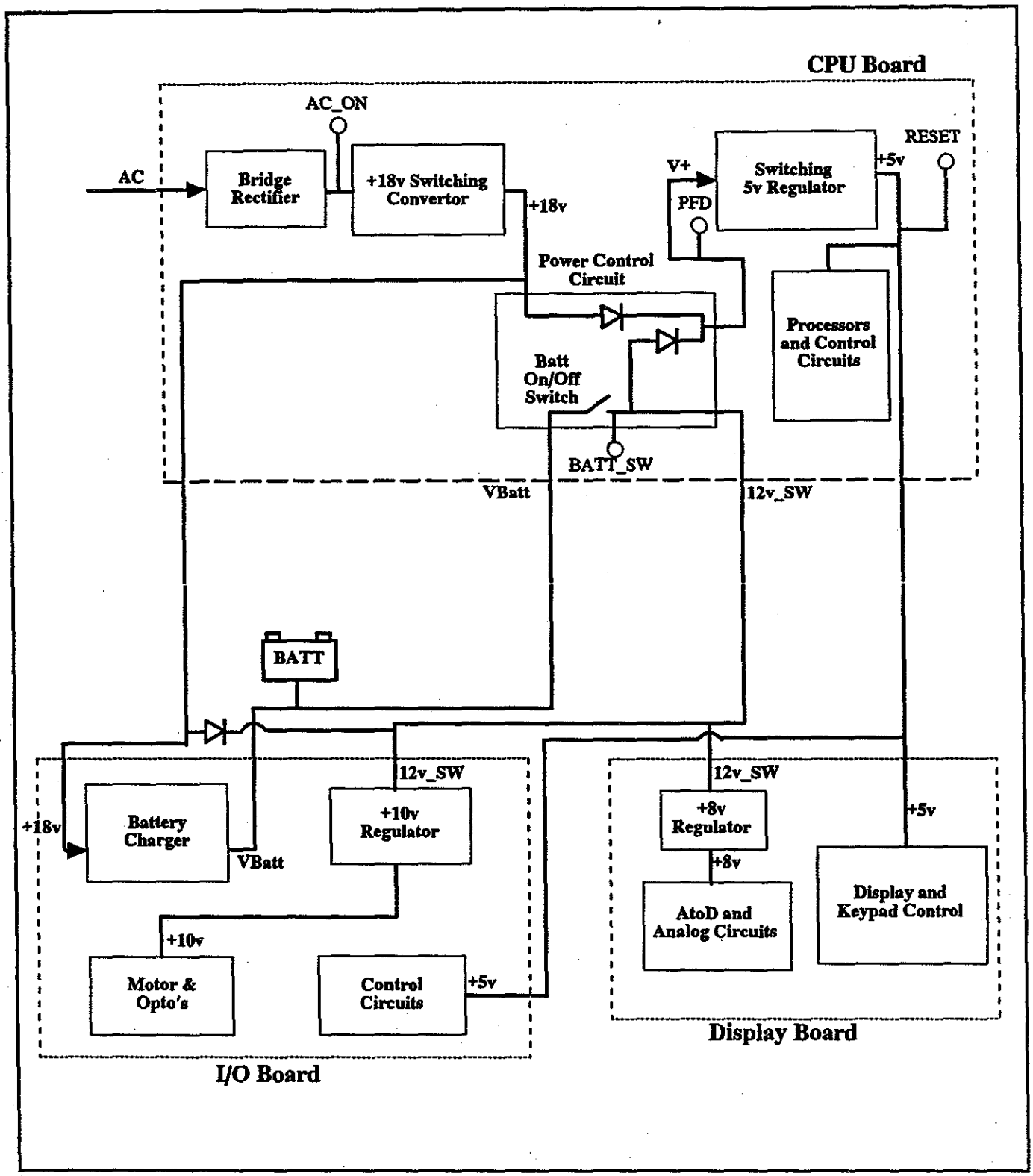


Figure 7-2
Power Routing Diagram

7.3 Electrical Routing

Figure 7-3 illustrates the electrical routing of the Model 3000 and Micro 3100 electrical systems. These systems are discussed in Section 4 of this manual.

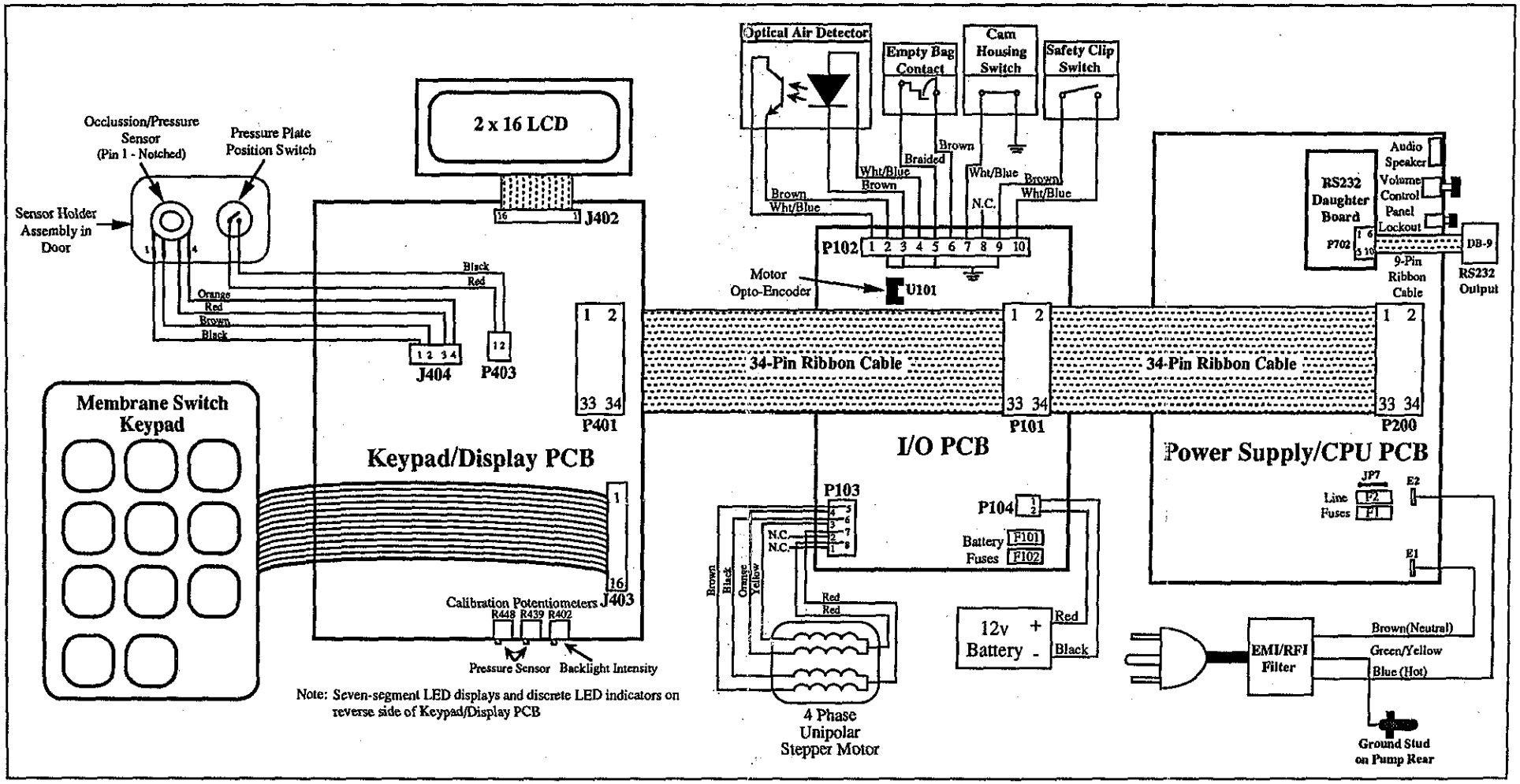


Figure 7-3
Electrical Routing
7-7 (3/94)

7.4 Electrical System Schematics

The following are the schematic diagrams for the Model 3000 and Micro 3100 Infusion Pumps.

TP.1 5 V

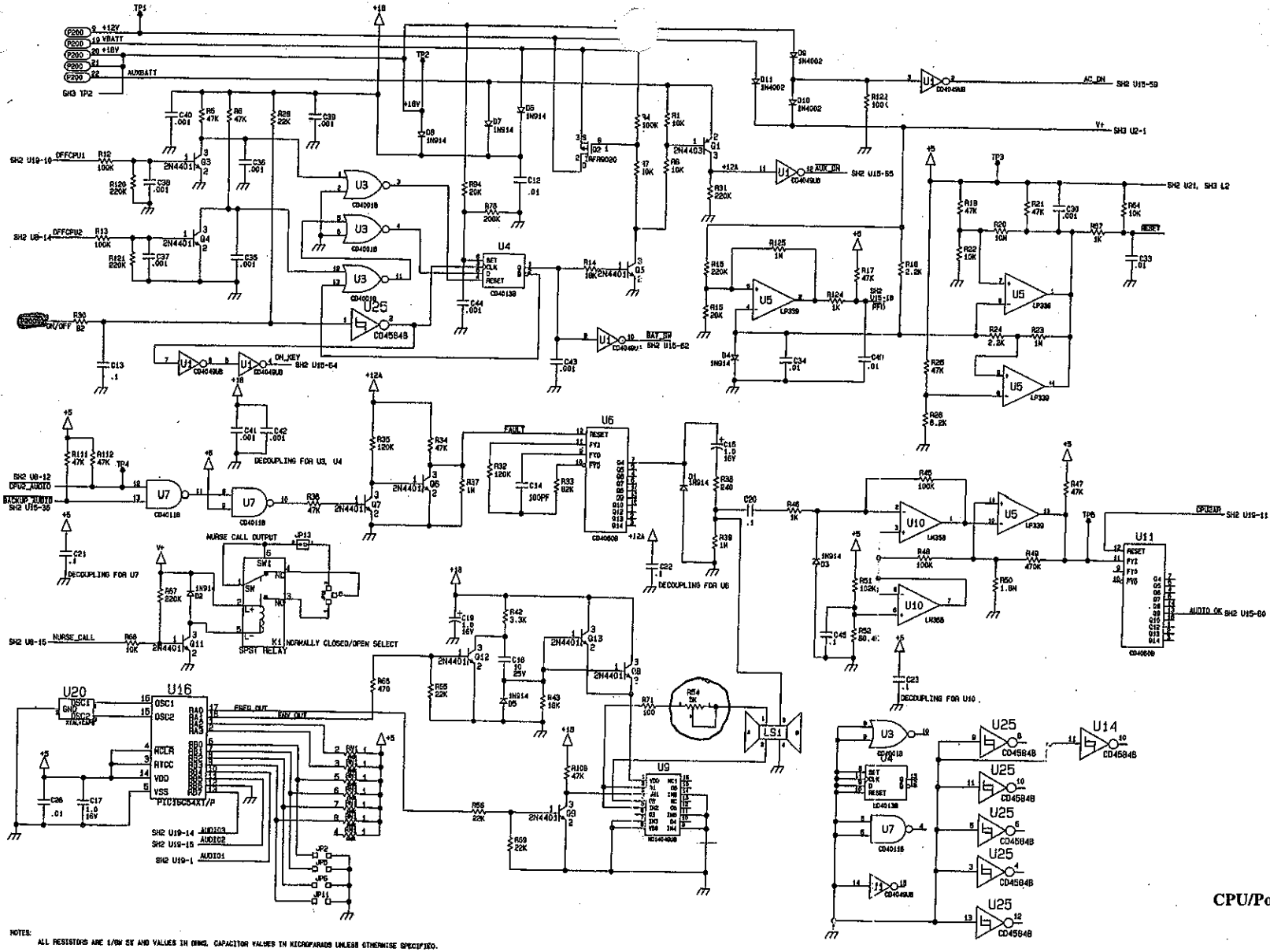
2 13.94 V

3 4.79 V

4 5

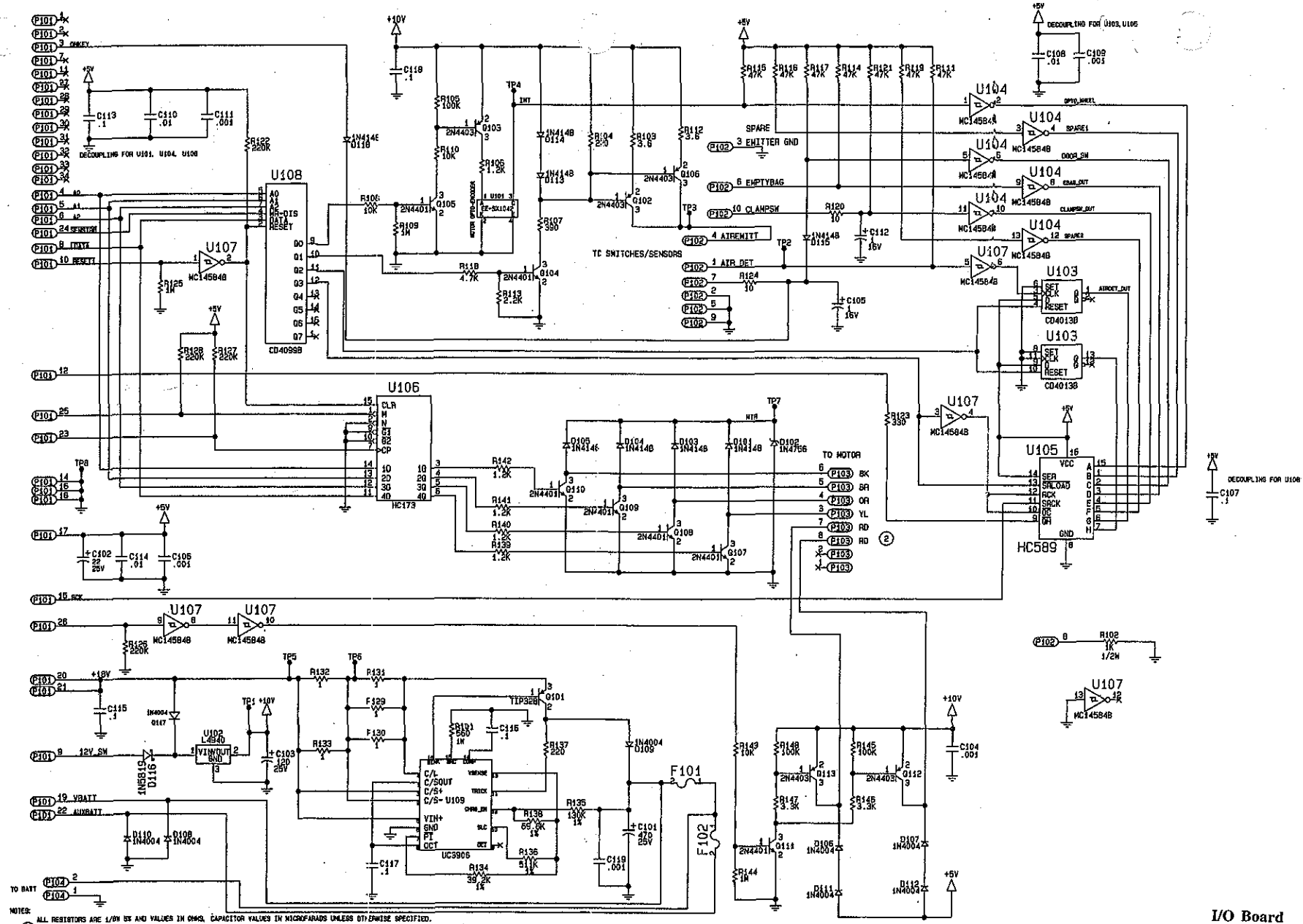
5 17.6 V

6 0 V

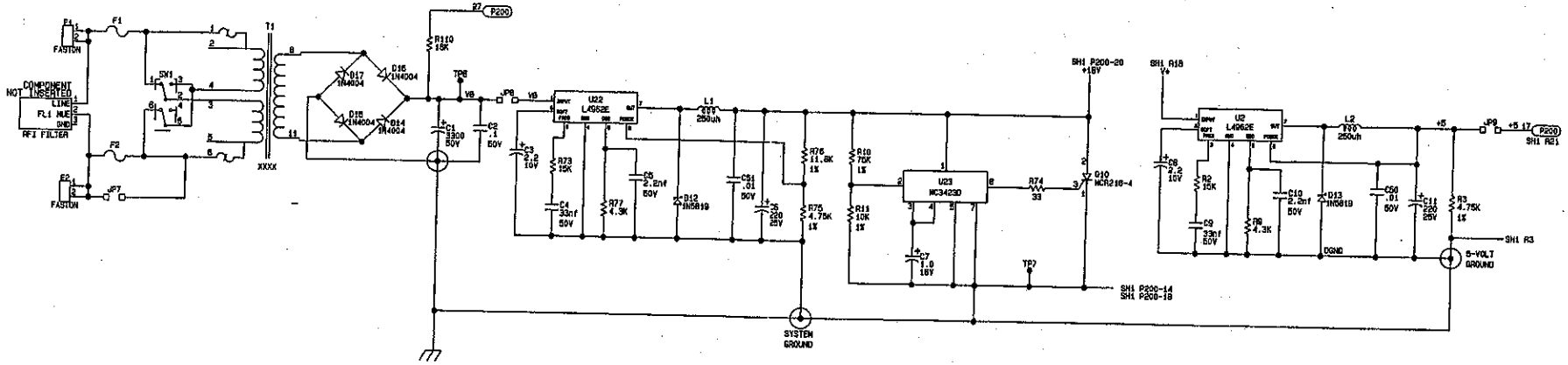


NOTES:
ALL RESISTORS ARE 1/8W 5% AND VALUES IN OHMS. CAPACITOR VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

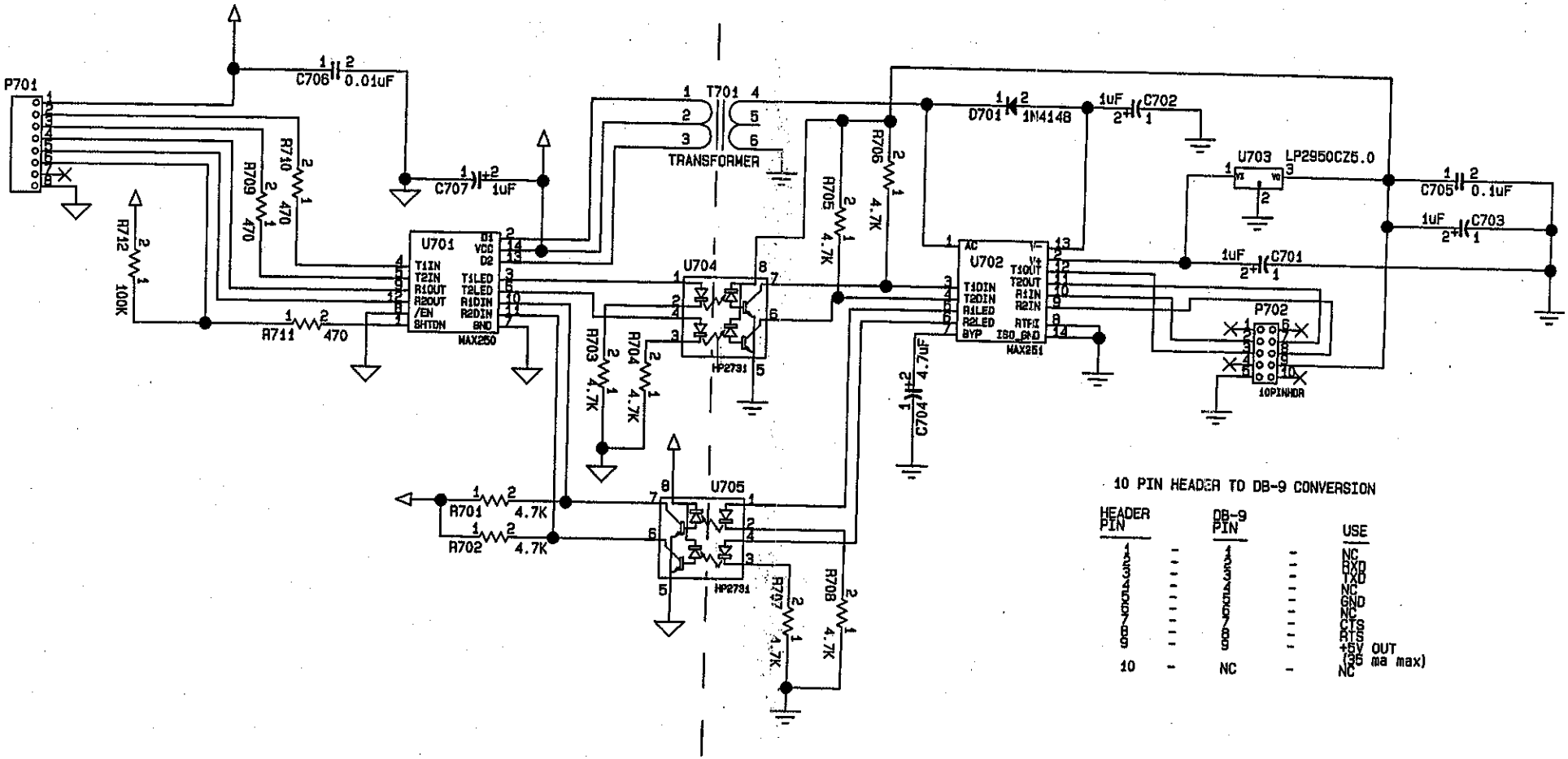
CPU/Power Supply
Sheet 1 of 3
7-9 (3/94)



I/O Board



CPU/Power Supply
Sheet 3 of 3


P701
C706 0.01uF
C707 1uF
R710 470
R709 470
R712 100K
R711 470
U701
MAX250
T701
TRANSFORMER
U704
HP2731
U705
HP2731
R703 4.7K
R704 4.7K
R705 4.7K
R706 4.7K
R701 4.7K
R702 4.7K
R707 4.7K
R708 4.7K
D701 1N4148
C702 1uF
U703 LP2950CZ5.0
C705 0.1uF
C703 1uF
C701 1uF
U702
MAX251
C704 4.7uF
P702
10PINHDR
10 PIN HEADER TO DB-9 CONVERSION
HEADER PIN
DB-9 PIN
USE
10 - NC - NC
+5V OUT (35 ma max)

RS232 Board

Section 8: Wave Form Diagrams

Model 3000 and Micro 3100

8.1 Sample Wave Forms

Oscilliscope wave forms for selected test points are pictured in the following figures.

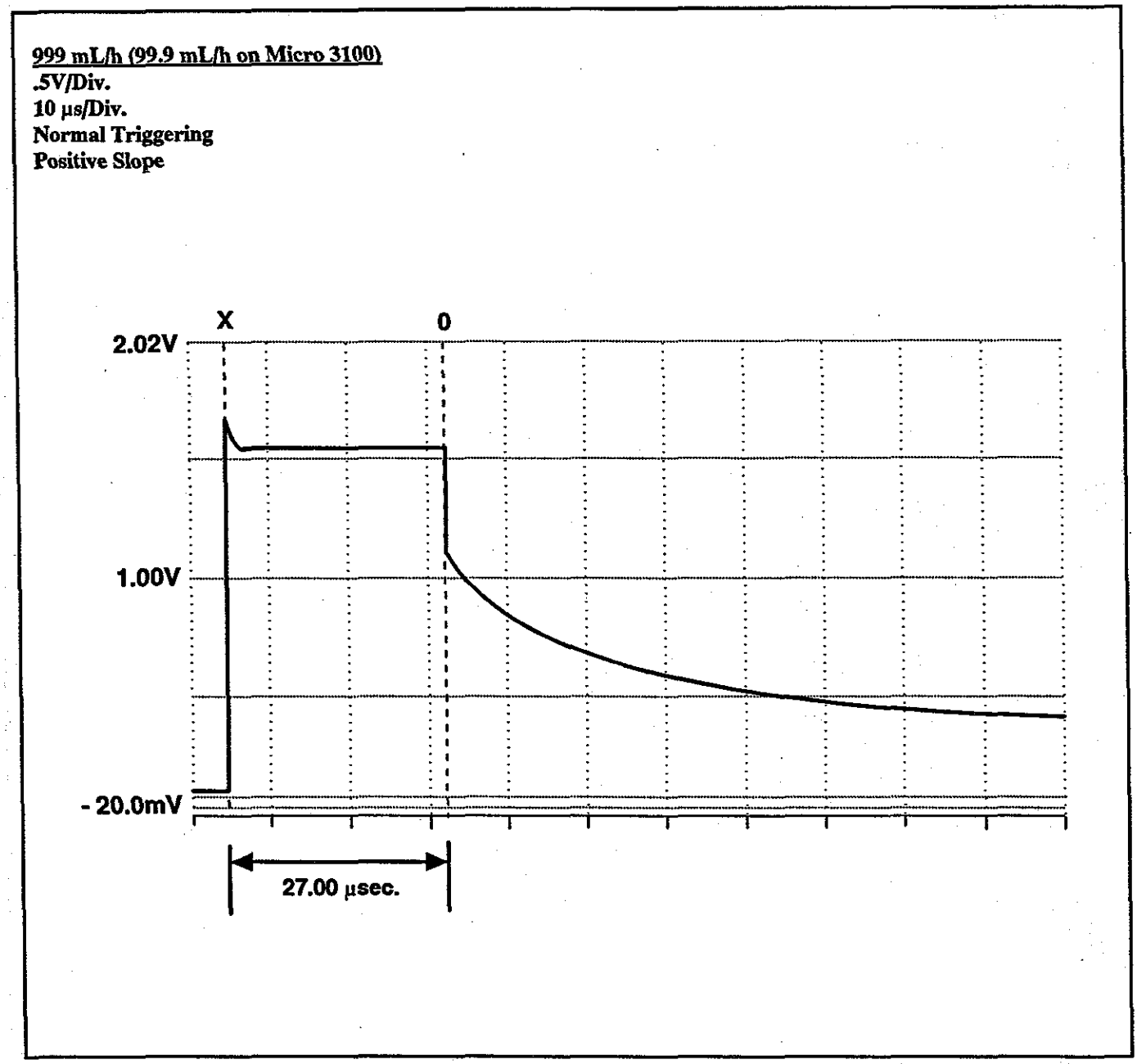


Figure 8-1
Air Detect - Emitter, TP3 on I/O Board

999 mL/h (99.9 on Micro 3100)
1V/Div.
100 µs/Div.
Normal Triggering
Negative Slope

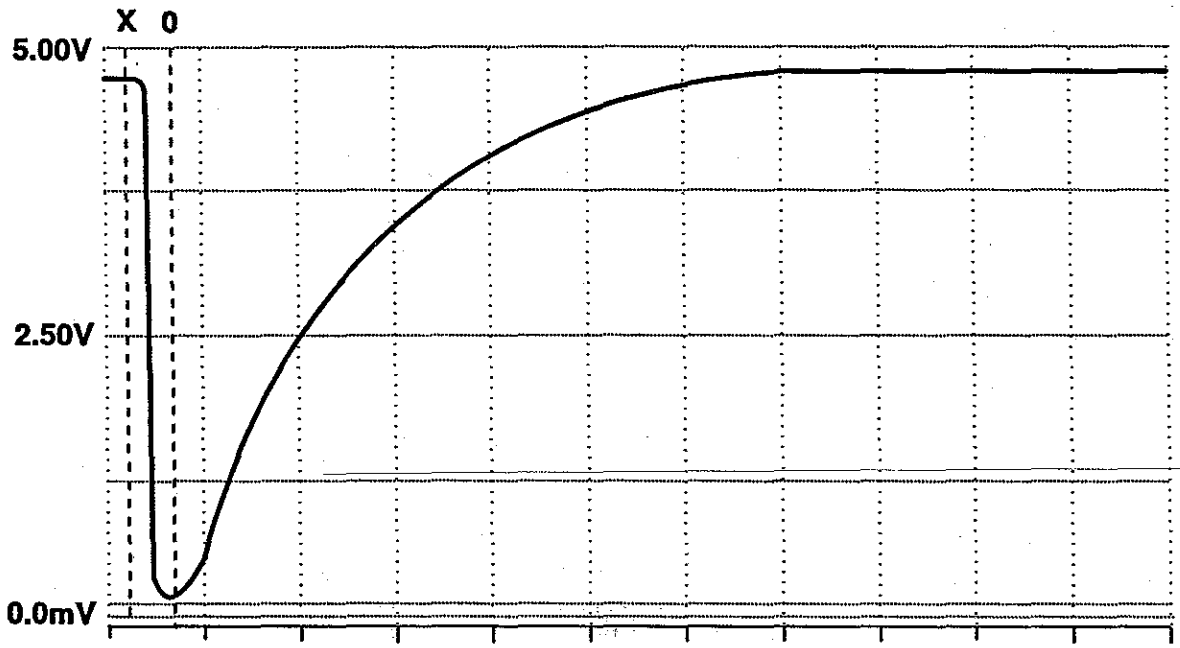


Figure 8-2
Air Detect - Detector, TP2 on I/O Board.
Wave Form can be seen approximately every 5 seconds on Model 3000, approximately every 60 seconds on Micro 3100

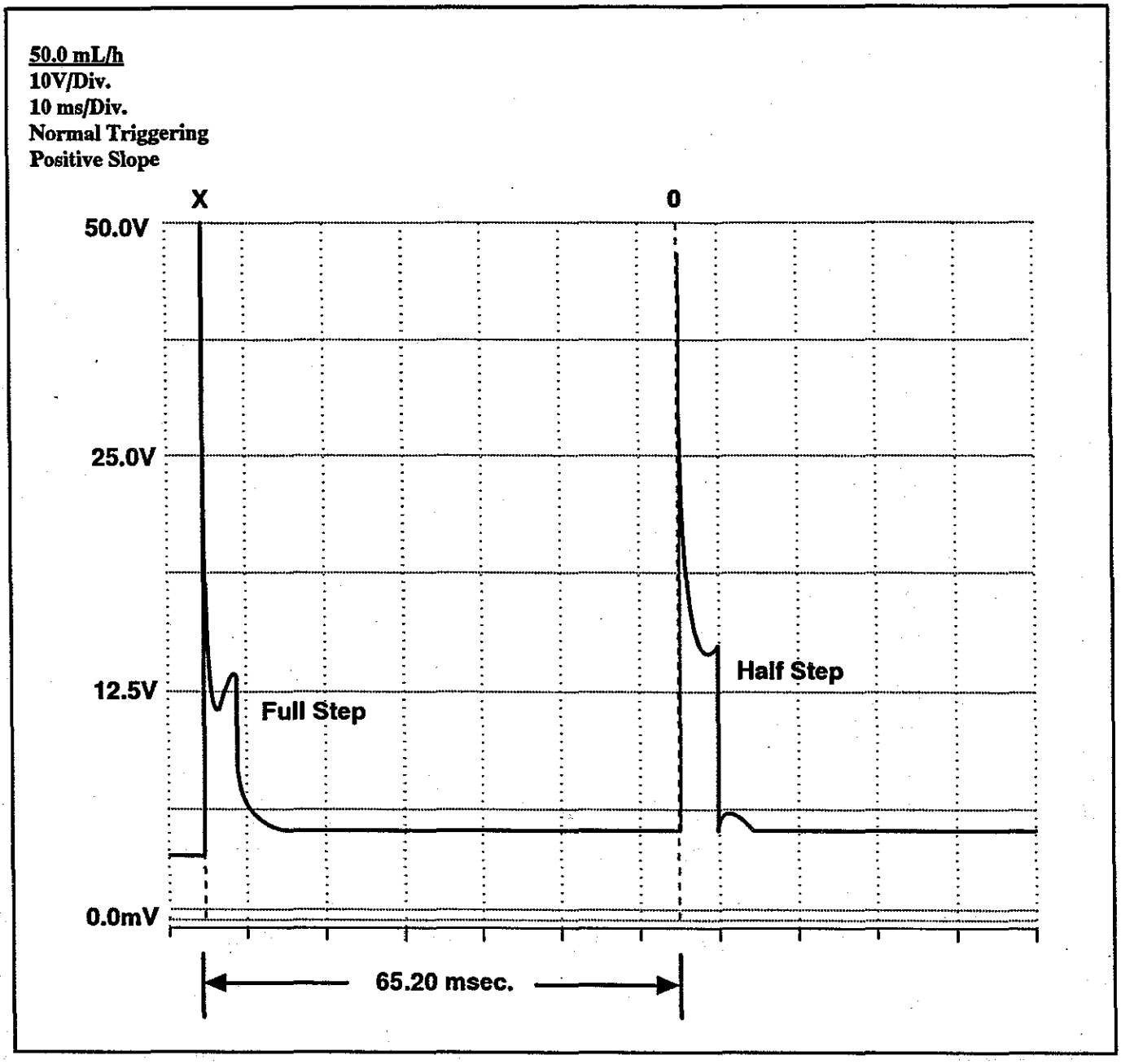


Figure 8-3
Motor Drive Pulses, TP7 on I/O Board

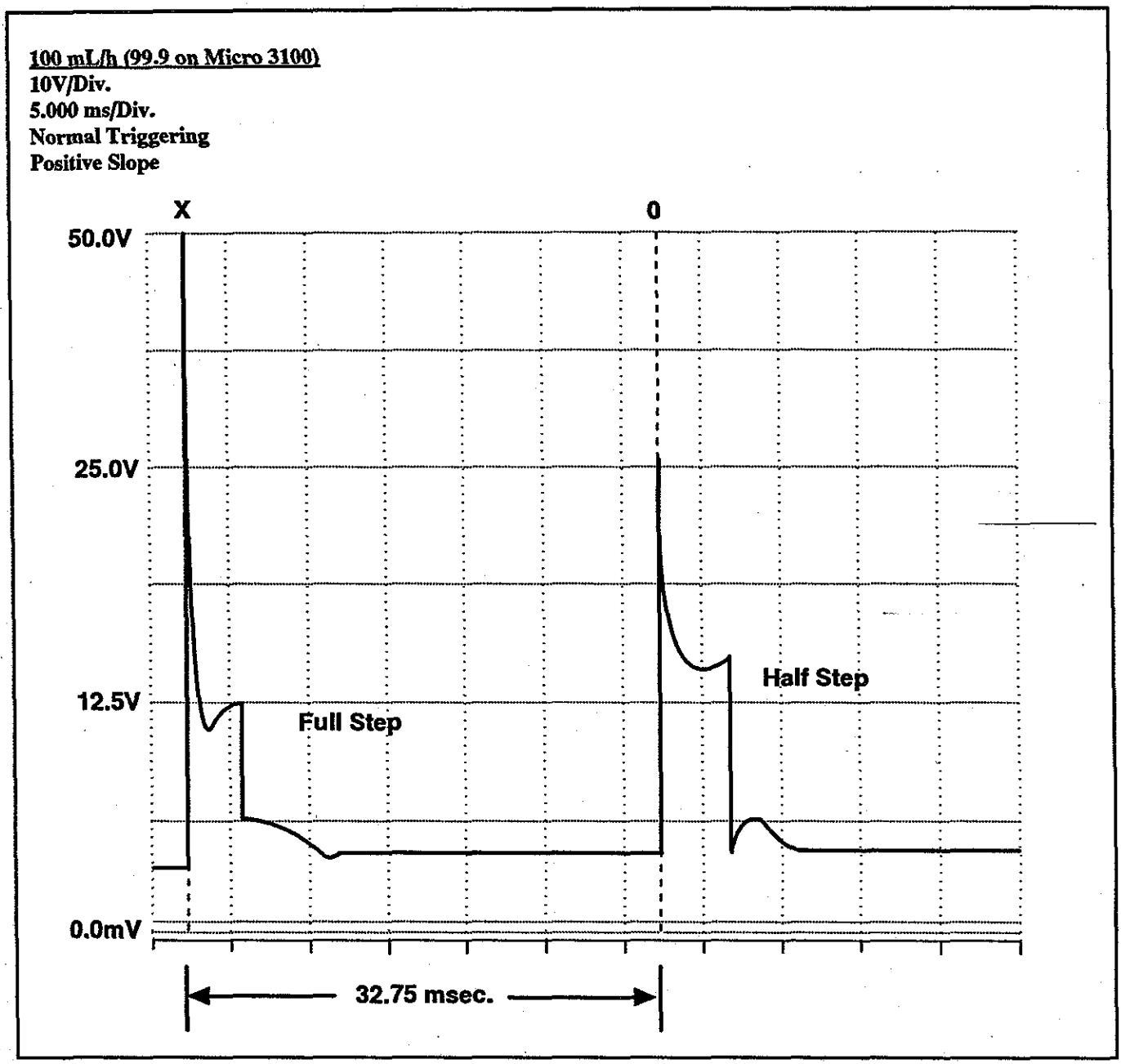


Figure 8-4
Motor Drive Pulses, TP7 on I/O Board

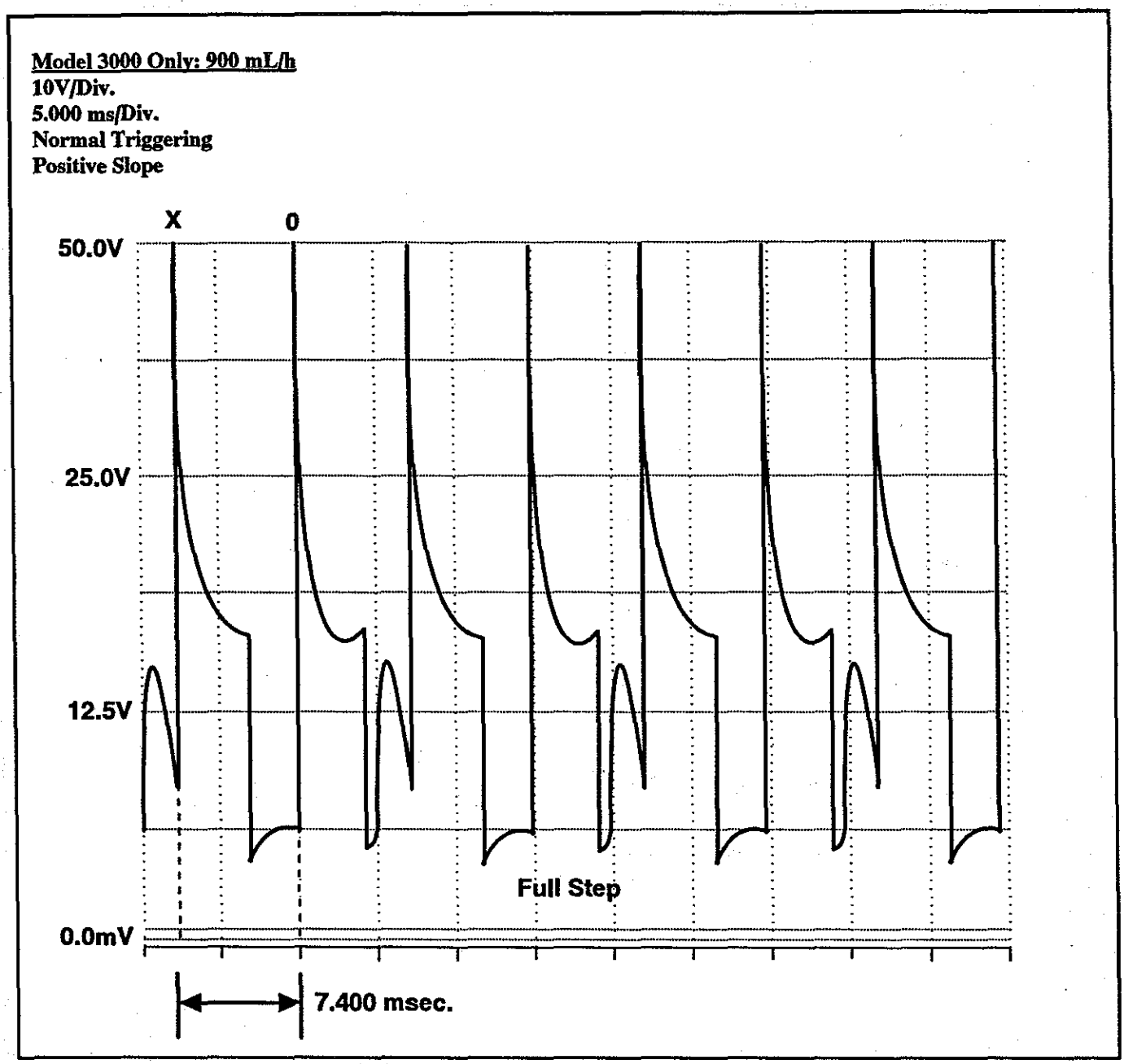


Figure 8-5
Motor Drive Pulses, TP7 on I/O Board

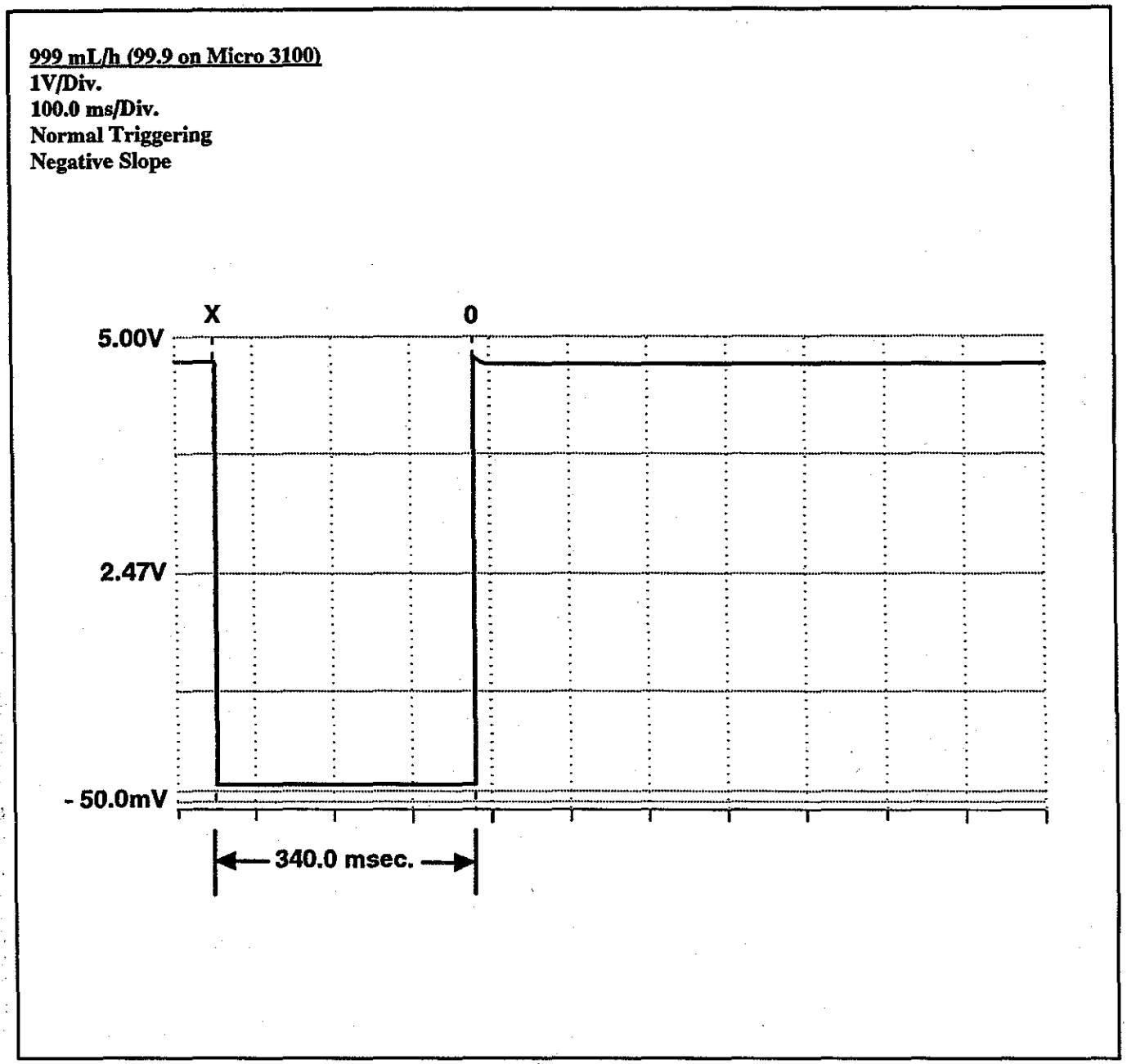


Figure 8-6
Empty Bag, P102 Pin 6, I/O Board. Pulse duration and time between pulses varies with pumping rate. Example above corresponds to 999 mL/h on Model 3000.

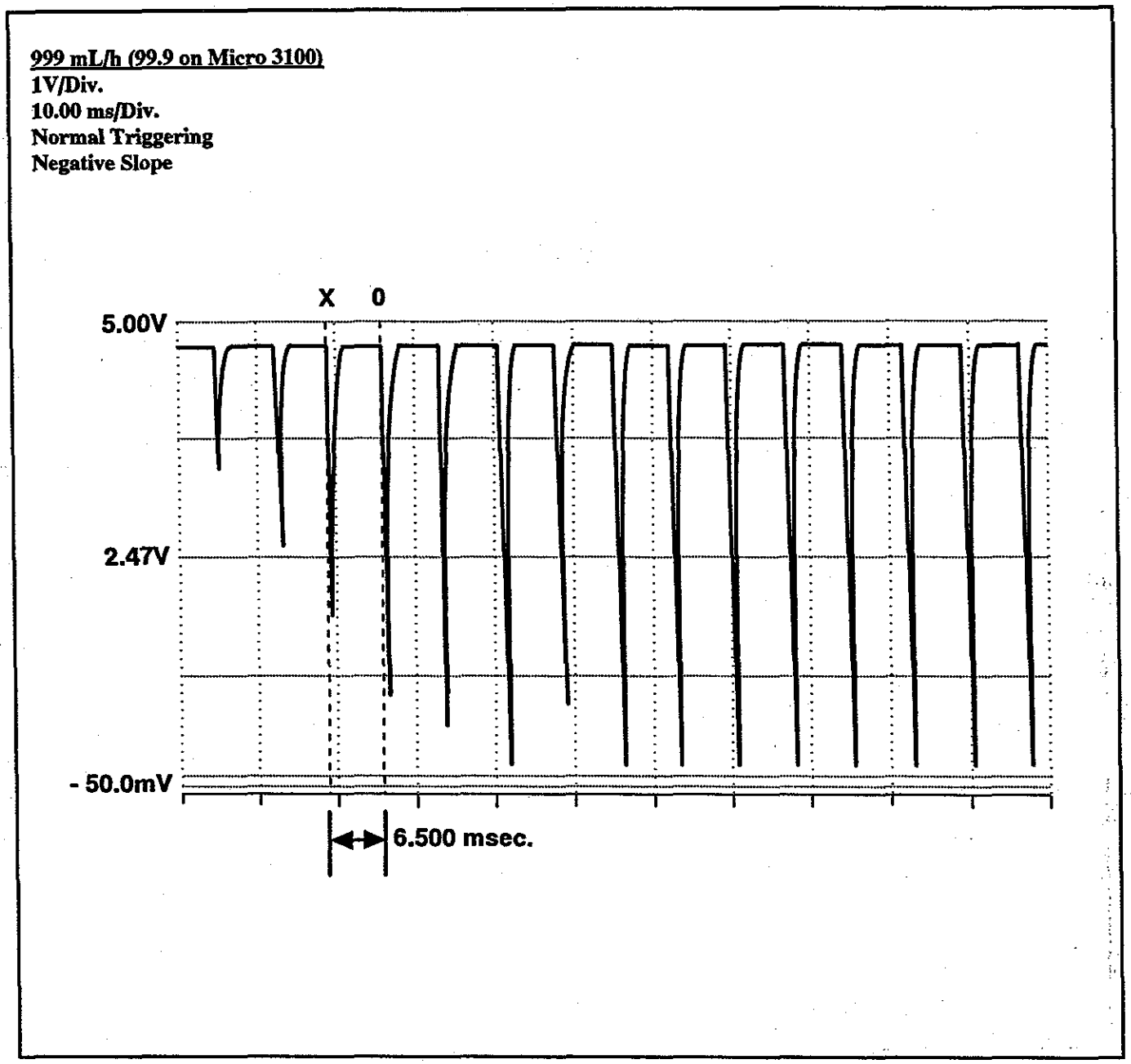


Figure 8-7
Interrupter Detector, TP4, I/O Board.
On the Model 3000, the signal appears approximately every 3 seconds at 500 mL/h, and approximately every 15 seconds on the Micro 3100 operating at 99.9 mL/h.

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Section 9: Message Display Screens

Model 3000 and Micro 3100

9.1 Message Display Screens

The following lists the Message Display screens associated with each operation/optional function of the Model 3000 and Micro 3100. The screen message is shown, along with the section number where the screen description can be found.

9.2 Message Screens and Section References

Screen:	Section Reference:
AC _____ Charge _____ Batt _____	3.8-6
Air in cassette	3.6-8
Alarm Test Press 1,2 or 3	3.8-12
Battery Test only on Hold	3.7-4
Battery Test Press * to begin	3.7-4
Battery Test Unplug then test	3.7-4
Battery too low Plug in cord	3.4-2B & 3.6-12
Battery use ____ hr: ____	3.8-10
Baud Rate: ____ ↓ ↑ to change	3.8-8
Cannot infuse * To review	3.7-6
Close clamp! Load Safety Clip	3.6-13
Door open	3.3-5 & 3.6-10
End early ___min Press * when set	3.7-6
English ↓ ↑ to change	3.8-9
Exit Rate Taper? Press * to exit	3.7-6
Exit ↓ ↑ Rate? Press * to exit	3.7-5
Hrs _____Liters _____ Load _____	3.8-5
KVO _____mL this infusion	3.6-1
Loading problem Check tubing set	3.6-14
Low battery Plug in cord	3.6-2
Maximum ____mL/h Press * when set	3.7-6

Screen:	Section Reference:
Maximum _____ mL/h * To continue	3.7-6
Model_____ ___.___ DB:__.__ MM:__.__	3.8-11
No flow above pump	3.6-9
Occlusion below pump	3.6-7
On Hold	3.4-5, 3.6-11
Press 1 to ↓ Press 3 to ↑	3.7-5
Pressure calib. ____ ___ __ __	3.8-7
Pressure sensor calibrate on AC	3.8-7
Pump needs service	3.6-5
Rate change not completed	3.2, 3.6-3
Rate Taper Press * to set	3.7-6
Maximum ____mL/h Press * when set	3.7-6
RUN to end early * to continue	3.7-6

Screen:	Section Reference:
Run to infuse * Resets Taper	3.4-1B, 3.7-6
Secondary was set	3.4-7, 3.6-4
System Check Turn off then on	3.4-1B, 3.4-1C, 3.6-6, 3.8-1
System Error No RV Ram	3.4-1B
System Error: ROM Checksum	3.4-1B
System error Service code ___	3.8-1
System warning Service code ___	3.8-1
Taper _____mL this infusion	3.4-1B, 3.4-4
Taper up __h ___min Press * when set	3.7-6
To keep light on press *	3.7-3
To turn light off press *	3.7-3
Total __h ___min * to continue	3.7-6
Total __h ___min Press * when set	3.7-6

Screen:	Section Reference:
Tpr down __h ___min Press * when set	3.7-6
Volume _____ mL Press * when set	3.7-6
_____hrs ____min remaining	3.7-2
_____ mL this infusion	3.4-1B, 3.4-4, 3.6-1, 3.7-1, 3.7-6
____mL ___h ___m Press * to clear	3.3-1
____mL ___h ___m total infusion	3.3-1
↓ ↑ _____mL this infusion	3.7-5

Screen:	Section Reference:
↓ ↑ Rate Change Press * to begin	3.7-5
1 For Total Time 2 For max rate	3.7-6
++++++++++++++ LOW battery FULL	3.7-4
xx xxx xxx xxx xxx xxx xxx xxx	*Biomedical Special Function, 3.8-3
xx xxxx xxxx xx xxxx xxxxx xxxxx	*Biomedical Special Functions, 3.8-2
xx:xx:xx GMT xx/xx/xx	*Biomedical Special Functions, 3.8-4

* x represents a digit, actual numbers will vary.